

INTRODUCTION

"Ucancam V8 User Manual" was written specially for users of Ucancam V8 engraving software. The content in this manual includes installation of the software, editing of text and drawings, object operation, creation and simulation of tool paths, etc.

For the latest information about Ucancam software, please visit our website www.ucancam.com or www.wt.com.cn.

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“Ucancam V8 User Manual” is provided for users of Ucancam V8 software and gives a detailed instruction about installation and operations of Ucancam V8 software.

Ucancam V8 has powerful functions and convenient interfaces. It has been widely used in such fields as advertisements, mould-making, seal-making, sign-making, gift-manufacturing, decoration, art works, woodworking, etc.

There are twelve chapters in this manual, including software installation, basic operations, shape drawing, object operations, shape editing, text editing, node editing, tool paths, etc.

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CHAPTER ONE SYSTEM REQUIREMENTS & INSTALLATION

1.1 System Requirements

- ✧ Operation system: Windows2000/XP
- ✧ CPU: Intel Pentium II, 300 or above, or same-level CPU, (preferable P4 2.4G or above)
- ✧ RAM: 128MB or above, preferable 256MB
- ✧ Hard disk: 500M
- ✧ Monitor display: resolution 800 600, 256 colors, preferable 1024 768, true color
- ✧ CD drive: CD-ROM/DVD driver
- ✧ Port: available with Mouse port and USB2.0 port

1.2 Installation of UcanCam V8

Don't insert the USB dongle into the USB port of your computer before installation. To install your program and the USB dongle, please follow the procedures step by step.

1. Put the installation disk into the CD-ROM driver.
2. Run the file **wtSetup.exe** in the disk.
3. The initialization interface is shown after running the program. See Fig.1-1.



Fig. 1-1

4. Then the welcoming dialog is shown (Fig.1-2). It is suggested to close other running programs during installation of this software to avoid incorrect installation. (Press **Alt +Tab** to switch among programs.)

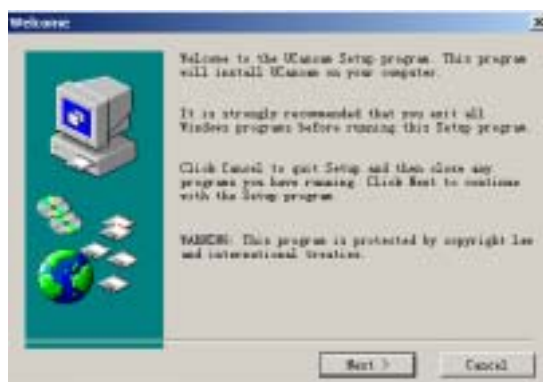


Fig.1-2

5. Click Next, and the License Agreement dialog is shown. (Fig.1-3) Please read it carefully as this program is protected by copyright law, and any copying or spreading of the program without authorization from Wentai Technology Co., Ltd is subject to civil and criminal sanction. Click Yes to continue installation, and click No to exit installation.

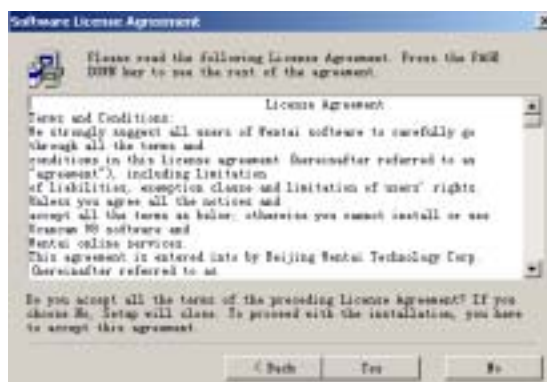


Fig. 1-3

6. Click Yes, and Choose Destination Location dialog is displayed. Click Next if you want to install the software in the default path (Fig.1-4).



Fig. 1-4

- Click Browse if you want to change the installation path. Click OK to continue.



Fig.1-5

7. The program then asks whether you want to create a shortcut icon of Ucamcam V8 on the desktop. (Fig.1-6). It is suggested to select Yes.

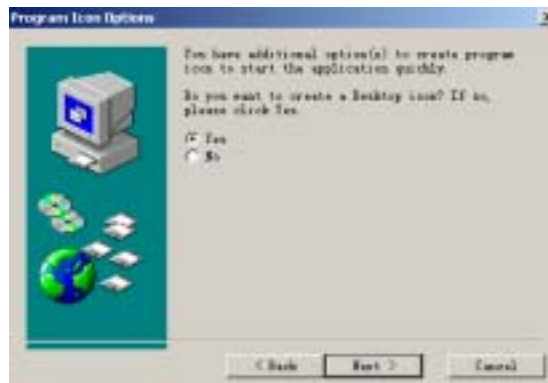


Fig.1-6

8. Click Next, and Start Copying Files dialog (Fig.1-7) is shown. The selected installation path and file are shown in the dialog. Click Back if you want to change the path and file.

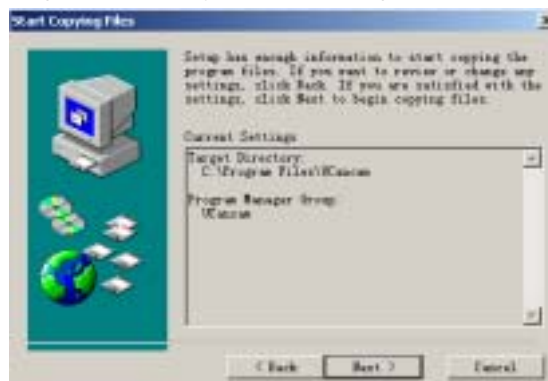


Fig.1-7

9. Click Next to start copying files. (Fig.1-8)

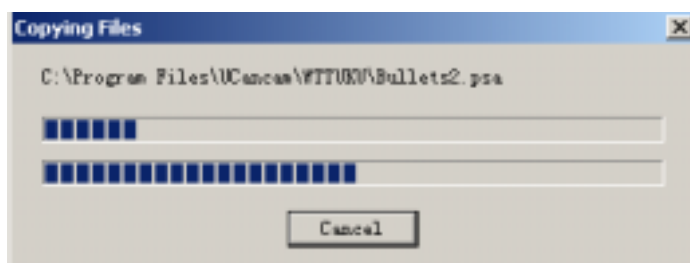


Fig.1-8

10. After copying the file, the installation of USB dongle driver begins automatically.



Fig.1-9

11. The installation of USB dongle begins. (Fig.1-10)

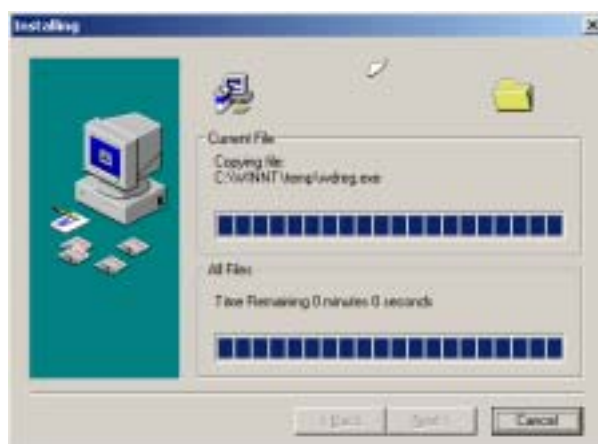


Fig.1-10

12. After the installation of USB driver, the following dialog displays to indicate that the installation has been completed. (Fig.1-11)




Fig.1-11

13. Click **Finish** and the dialog **Setup Complete** displays. (Fig.1-12)



Fig.1-12

14. Click **Finish** to end installation.

An icon  is formed on desktop.

After confirming that the USB port of your PC is in normal working order, insert the USB dongle into the USB port of your computer, or connect the USB dongle with the computer through USB cable.

You can now work with Ucamcam V8.

CHAPTER TWO BRIEF INTRODUCTION TO UCANCAM V8

2.1 Brief Introduction

2.1.1 Application

Ucancam V8, a special application software in CAD (Computer-Aided Design) and CAM (Computer-Aided Manufacturing), is widely used in such areas as advertisements, seal-making, sign-making, gift manufacturing, decoration, art design, woodworking and mold-manufacturing.

2.1.2 Features

Two types of interface

Both the new interface and the original 2000/2002 interface are available for users to choose according to your habits.

Node editing

Functions in node editing include: add, delete, disconnect, connect, close, convert to line, convert to curve, cusping, smooth, symmetry, node align, start point, auto remove points, fillet, chamfer, and vertical.

Text Editing

Text can be rotated, scaled, moved, sheared, arranged along curves, etc. and they can be edited again in text edit mode after these transformations. Besides, text input in a frame is also available, with automatic line feed.

Serial number text

This function is used with making some designs of serial number texts.

Accurate drawing

Accurate drawing is made easy by means of keyboard input. Feature points such as end points, midpoints, intersection points, perpendicular foot, and tangent points can be snapped.

Editing Tools

Various Editing Tools are provided, including trim, delete, offset, divide, close, simple slice, complex slice, Boolean operation and duplication. Geometrical-shape-transforming tools include move, rotate, scale, mirror, shear, perspective distortion, envelop distortion, twist distortion, push and pull distortion and auto nesting.

Image tracing

Images in various formats can be imported, converted, and stripped. Image tracing is available with Ucancam V8 in order to extract contour. Angle degrees can be adjusted, and accurate tracing

parameters such as cusp angle, trace error, fairy number, approximal precision, and threshold of line can be set.

Other aided tools

There are numerous viewing tools which are used to view objects from different viewing angles.

Measuring tools for measuring length, angle, perimeter, size and other tools like ruler, guide line, notepad, calculator, Microsoft paint are also available.

Tool path

Tool paths are calculated quickly and accurately for NC machining. Ucamcam V8 provides a **Tools Library** where users can choose, edit, add or delete a tool. Various machining solutions are available. Users can apply tool path walk simulation to check whether tool paths are valid and to preview machining results. These simulation functions are also useful to reduce trial cutting times and cut down machining costs and help users to get valid and effective machining results.

2.2 Run/Exit Ucamcam V8

2.2.1 Run Ucamcam V8




A shortcut icon  appears on your computer desktop after installing Ucamcam V8 software, and a program group is formed automatically in the **Start** menu. The software can be run either by double clicking on the icon  (Fig.2-1) or by clicking **Program->UCanCam->**  (Fig. 2-2)



Fig. 2-1

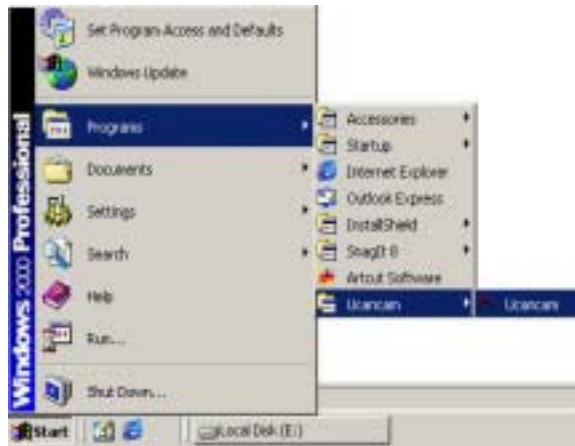


Fig. 2-2

The Page Size dialog displays after starting the software. (Fig. 2-3) Set the page size, and click on OK or press the Enter key to enter Ucancam V8 software.

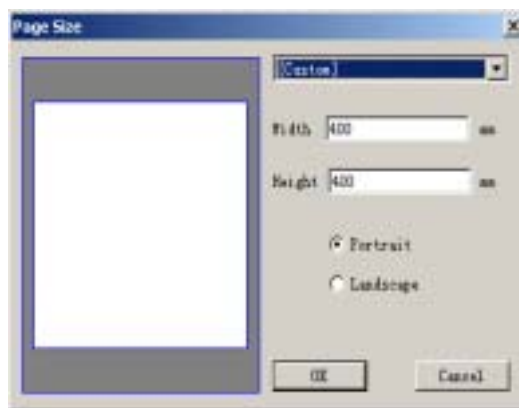




Fig. 2-3

REMARK: Refer to 3.3.1 of Chapter three to see how to set the Page Size parameters.

2.2.2 Exit Ucancam V8

Four ways to exit the program.

- Click the button  on the upper right corner of the window.
- Click File->Exit.
- Press the shortcut key Alt+F4
- Double click on the icon  in the corner of the window

A dialog appears to ask if you want to save the file that you haven't saved. (Fig 2-4)

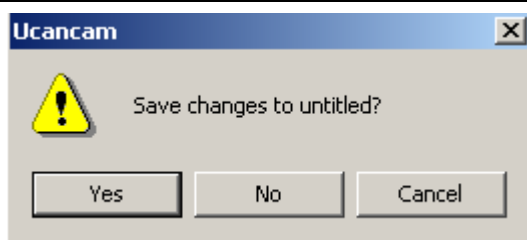


Fig. 2-4

2.3 Interface

Both new Ucamcam V8 interface and Wentai 2000/2002 interface are available for the users to choose according to your habits.

2.3.1 Standard Interface

Standard interface refers to Wentai 2000/2002 interface, which is also the default interface of Ucamcam V8. (Fig. 2-5)

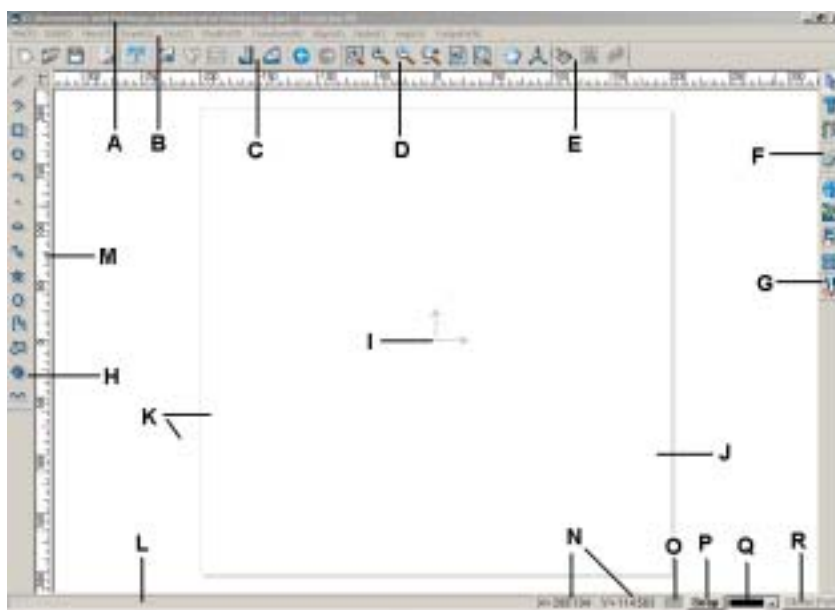



Fig. 2-5

A. Title bar: displays file name or software name on the left; on the right are minimize button ,

maximize/back button  and close button .

B. Menu bar: includes File, Edit, View, Draw, Text, Modify, Transform, Align, Node, Help, and Tool Path.

C. Standard Bar: displays icons of commonly used tools

D View Bar: displays icons of viewing tools.

E. Edit bar: displays icons of editing tools.

F. Edit mode tool bar: is for opening or closing tool bars and change editing modes.

G. Tool path: displays icons for tool path calculation.

H. Draw bar: displays icons for drawing simple shapes

I. Coordinates: are references to object positions.

J. Page: is the page size.

K. Drawing window: is the area for drawing.

L. Status bar: displays current operation status and parameters input.

M. Ruler: displays actual sizes of objects. It shows in the work interface in default setting.

REMARK. Click **View->Rulers** command to show or hide rulers.

N. X / Y Coordinates: Shows coordinates.

O. Show/Hide the Grids: Show or hide background Grids.

REMARK. Click **View->Grids** to show or hide background Grids.

P. Snap setting: Set the types of points to be snapped and control the show and close of the function.

Q. Color: is for setting color.

R. Hide/Show: Show or hide tool paths.

REMARK. Click **View->Tool path** command to show or hide tool paths.

Move the mouse onto any shortcut button, names of shortcut buttons will be shown automatically.

2.3.2 Panel Interface

Panel interface is another interface of Ucamcam V8. With bars in tab form, this software is operated easily and quickly as the interface layout is quite clear. (Fig. 2-6)

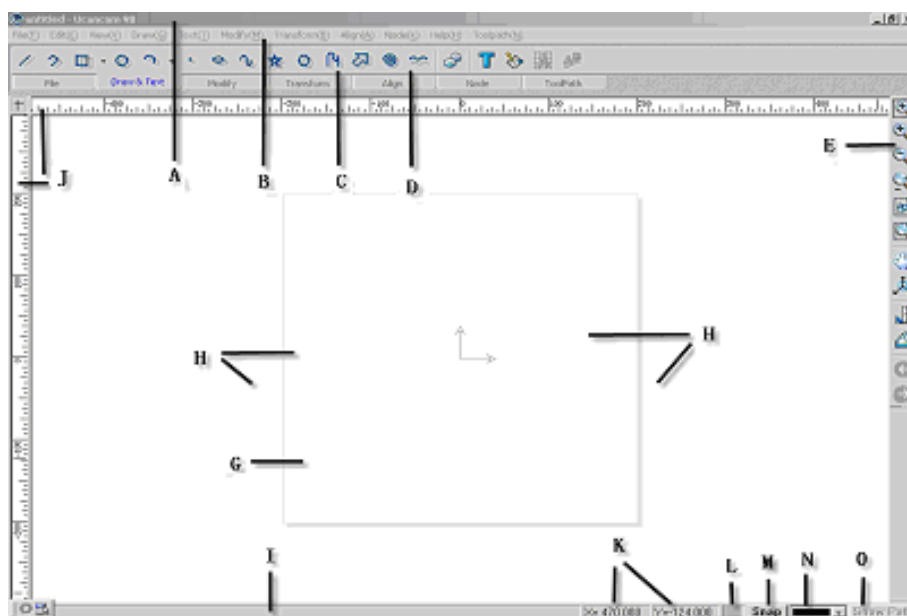


Fig. 2-6

- | | | |
|-----------------------|---------------------|-------------------------|
| A. Title bar | B. Menu bar | C. Shortcut button bar |
| D. Status switch bar | E. View tools bar | F. Coordinates axes |
| G. Page | H. Drawing window | I. Status bar |
| J. Rulers | K. X, Y coordinates | L. Show/Hide Grids |
| M. Snap shortcut icon | N. Color | O. Show/Hide tool paths |

2.4 ToolBar Settings

To switch between the above two kinds of interface, you should open ToolBar settings dialog. Click View->Toolbars, and the ToolBar Settings dialog displays. (Fig. ig.2-7)

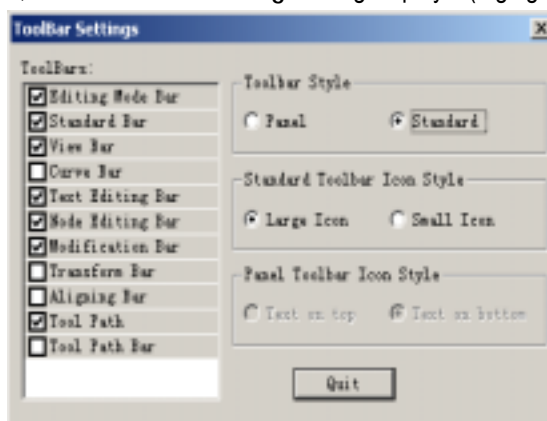


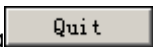
Fig 2-7

ToolBar Style: is to select a style of the interface.

Standard Toolbar Icon Style: is to select Large Icon style or Small Icon style in standard toolbar.










Panel Toolbar Icon Style: is to select an icon style in panel toolbar.

Toolbars: is to select one or more toolbars to be displayed in the interface. To hide a toolbar in the interface, deselect it.

















You can save the settings by clicking  or by pressing the Enter key in the keyboard.




Shortcut Icons

Shortcut icons are shortcuts to menu commands. The table below outlines commonly-used shortcut icons in Ucamcam V8.






ICON	FUNCTION	SHORTCUT KEY	LOCATION
	Start a file	Ctrl + N	Standard Bar
	Open a file	Ctrl + O	Standard Bar
	Save a file	Ctrl + S	Standard Bar
	Print	Ctrl + P	Standard Bar
	Page Size		Standard Bar
	Import a file	Ctrl + R	Standard Bar
	Image tracing		Standard Bar
	Image stripping		Standard Bar
	Distance measure		Standard Bar

	Angle measure		Standard Bar
	Undo	Ctrl + Z	Standard Bar
	Redo	Ctrl + Y	Standard Bar
	Line		Curve Bar
	Polyline		Curve Bar
	Rectangle		Curve Bar
	Circle		Curve Bar
	Arc		Curve Bar
	Point		Curve Bar
	Ellipse		Curve Bar
	Spline		Curve Bar
	Star		Curve Bar
	Polygon		Curve Bar
	Combine curve		Curve Bar
	Arrow		Curve Bar
	Spiral		Curve Bar

	Wavy line		Curve Bar
	Rapid input		Text Editing Bar
	Convert to curves		Text Editing Bar
	String alone a curve		Text Editing Bar
	Trim		Modification Bar
	Offset		Modification Bar
	Linear slice		Modification Bar
	Rectangular Slice		Modification Bar
	Ellipse slice		Modification Bar
	Parallel slice		Modification Bar
	Circular slice		Modification Bar
	Radial slice		Modification Bar
	Close		Modification Bar
	Join		Modification Bar
	Common		Modification Bar
	Subtract		Modification Bar




	Not common		Modification Bar
	Group	Ctrl + G	Modification Bar
	Ungroup	Ctrl + U	Modification Bar
	Direction		Modification Bar
	Divide		Modification Bar
	Expand		Modification Bar
	Duplication along a curve		Modification Bar
	Array duplication		Modification Bar
	Duplication along a line		Modification Bar
	Duplication along a arc		Modification Bar
	Duplication along a spiral curve		Modification Bar
	Move		Transform Bar
	Mouse		Transform Bar
	Scale		Transform Bar
	Horizontal mirror		Transform Bar

	Vertical mirror		Transform Bar
	Line mirror		Transform Bar
	Shear		Transform Bar
	Perspective distortion		Transform Bar
	Envelope distortion		Transform Bar
	Push & Pull distortion		Transform Bar
	Twist distortion		Transform Bar
	Auto nesting		Transform Bar
	Align on left	Ctrl + Num4	Aligning Bar
	Align on right	Ctrl + Num6	Aligning Bar
	Align to top	Ctrl + Num8	Aligning Bar
	Align to bottom	Ctrl + Num2	Aligning Bar
	Align on center	Ctrl + Num5	Aligning Bar
	Horizontal aligning	Alt + ,	Aligning Bar
	Vertical aligning	Alt + .	Aligning Bar
	Horizontal spacing	Alt + [Aligning Bar

	Vertical spacing	Alt +]	Aligning Bar
	Make same width	Ctrl + Alt + W	Aligning Bar
	Make same height	Ctrl + Alt + H	Aligning Bar
	Make same size	Ctrl + Alt + A	Aligning Bar
	Add a node		Node Editing Bar
	Delete a node		Node Editing Bar
	Disconnect		Node Editing Bar
	Connect		Node Editing Bar
	Close		Node Editing Bar
	Convert to line		Node Editing Bar
	Convert to curve		Node Editing Bar
	Cusping		Node Editing Bar
	Smooth		Node Editing Bar
	Symmetry		Node Editing Bar
	Node align		Node Editing Bar
	Start point		Node Editing Bar

	Auto remove points		Node Editing Bar
	Fillet		Node Editing Bar
	Chamfer		Node Editing Bar
	Vertical		Node Editing Bar
	Tool management		Tool Path Bar
	Tool path output		Tool Path Bar
	Profile machining		Tool Path Bar
	Area clearance		Tool Path Bar
	3D engraving		Tool Path Bar
	Midline machining		Tool Path Bar
	Drilling		Tool Path Bar
	Insert		Tool Path Bar
	Inlay		Tool Path Bar
	Prism machining		Tool Path Bar
	Intelligent machining		Tool Path Bar
	Embossing machining		Tool Path Bar

	Image relief machining		Tool Path Bar
	Tool path walk simulation		Tool Path Bar
	Zoom window	F6	View Bar
	Zoom in	Page Up	View Bar
	Zoom out	Page Down	View Bar
	Dynamic zoom	F7	View Bar
	Fit to all	F8	View Bar
	Fit to page	F9	View Bar
	Pan view	F10	View Bar
	3D view	F12	View Bar
	Selection tools		Editing Mode Bar
	Text editing tools	Ctrl + T	Editing Mode Bar
	Node editing tools	Ctrl + K	Editing Mode Bar
	Symbol library	Ctrl + M	Editing Mode Bar
	Draw basic vectors		Editing Mode Bar
	Editing tools		Editing Mode Bar

	Transform		Editing Mode Bar
	Align		Editing Mode Bar
	Tool path		Editing Mode Bar

Toolbars

Toolbars consist of commonly used commands.



Fig.2-8a Editing Mode Bar



Fig.2-8b Standard Bar

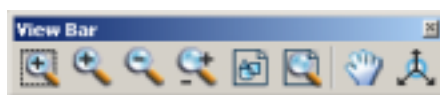


Fig. 2-8c View Bar



Fig.2-8d Curve Bar

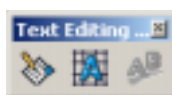


Fig.2-8e Text Editing Bar



Fig. 2-8f Node Editing Bar

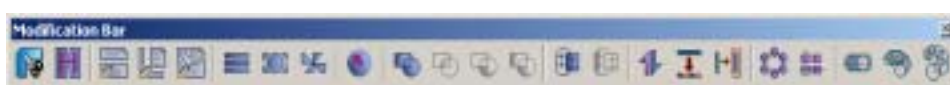


Fig.2-8g Modification Bar



Fig.2-8h Transform Bar

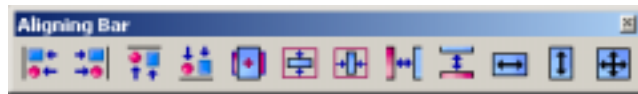


Fig.2-8i Aligning Bar



Fig.2-8j Tool Path Bar


CHAPTER THREE BASIC OPERATIONS

In this chapter, you will learn about the basic operations of Ucamcam V8.

3.1 File Operation

3.1.1 Open A File

There are 3 ways to open a file:

- Click on the icon  on Standard Bar
- Click File->Open
- Press Ctrl+O.

Then the Open dialog displays. (Fig. 3-1)



Fig. 3-1


You can choose the path of the file, or enter the file name after File Name. Select Preview to preview contents of a selected file.

Click  after selecting the file name to open the file.

REMARK. The selected file can also be opened by double clicking the file or by pressing the Enter key on the keyboard.

3.1.2 Create A New File

Any of the following three ways can be chosen to create a new file.

- Click on the icon  on Standard Bar
- Click File->New
- Press Ctrl + N

Then the Page Size dialog displays. (Fig. 3-2)

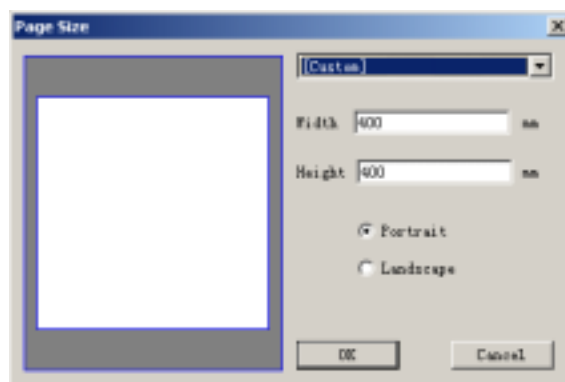


Fig.3-2

Custom: is for users to set the size of the Page. (Fig. 3-3)

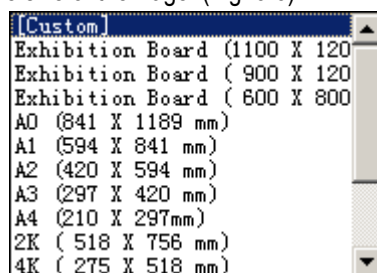


Fig. 3-3

Width and Height: is the width and height of the Page. You can input height and width parameters after selecting Custom.

Portrait and Landscape: is the orientation of a Page. (Fig. 3-4)

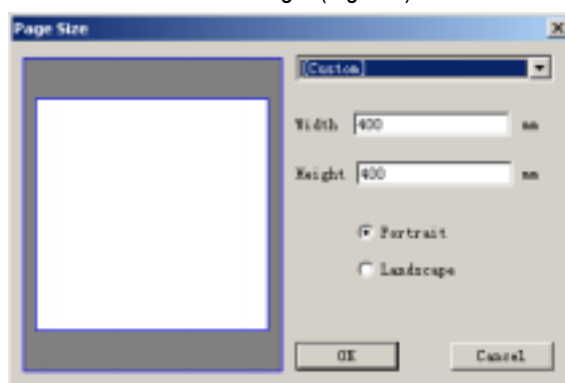


Fig. 3-4a (portrait)




Fig. 3-4b (Landscape)

After selecting or setting a Page, click on  or press the Enter key to create a new Page.

3.1.3 Save A File

There are three ways to save a file.

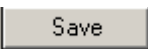
- Click on the icon  on Standard Bar
- Click File->Save.
- Press Ctrl + S.

In case of creating a new file or changing the path of a file, press Ctrl +Shift +S or click File->Save As. Then the dialog Save As is shown. (Fig.3-5)



Fig. 3-5

Users can select the saving path of the file in the pull down box Save As Type, and then input the name of the file. Select Preview in the bottom right corner of the dialog to preview the file.

After selecting the saving path and name of the file, click on  or press the Enter key to save the file.

3.1.4 Import File

Click File->Import File to import a file to the current page.

The following are file formats that is compatible by Ucamcam V8. (Fig.3-6)

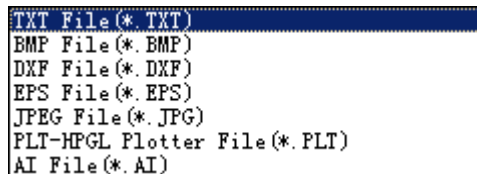


Fig.3-6

TXT file: ASCII text file.

BMP File: windows-bitmap, bitmap, Windows or OS/2 bitmap file.

DXF File: The Drawing Interchange Format (DXF) enables the interchange of drawings between AutoCAD and other programs.


EPS File: Encapsulated PostScript (EPS) is a standard file format for importing and exporting PostScript files.

JPEG File: JPEG is a file format created for storing still color images. It provides very good compression, but does not uncompress exactly as it was.

PLT File: PLT (also HPGL) created by Hewlett-Packard is the standard language for printing line drawings. HPGL is supported by many CAD, charting and word processing applications.

AI File: Adobe Illustrator file format

There are 3 ways to import a file:

- Click on the icon  on **Standard Bar**.
- Click File->Import file in the menu bar
- Press Ctrl + R.

Then **Import File** dialog displays. (Fig. 3-7)

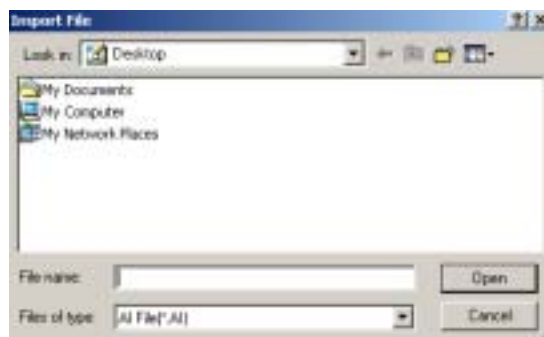
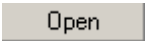


Fig. 3-7

The only difference between **Import File** dialog and **Open** dialog is that you can select other file

formats in **Import File** dialog. The file is opened after clicking on it and then clicking on  or pressing the Enter key.

REMARK: When you want to import a file whose format is not supported by this software, please use other software such as windows paint and Photoshop to convert it to file formats compatible for this software before importing the file.


3.1.5 Export File

You can save a file into other formats (e.g. DXF, PLT) compatible with other software. Choose the objects to be saved and then click **File->Export** in the menu bar.

3.2 Viewing Tools

3.2.1 Zoom Window

Parts of a shape can be viewed closely through **Zoom window**. The following are three ways to start **Zoom window**.

- Click on the icon  on **View Bar**.
- Click **View->Zoom window** in the menu bar.
- Press the shortcut key F6.


Then the cursor changes into . Hold the left mouse button and move the cursor to form a view box; release the mouse button, then that part of the object is magnified.



Fig. 3-8 a (original view)

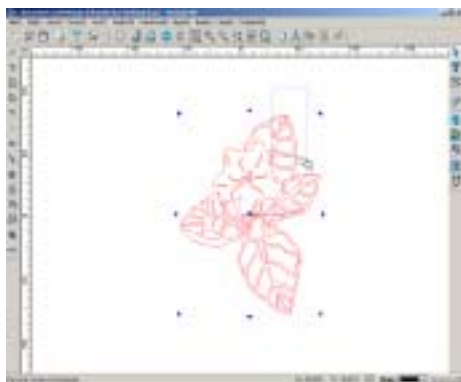


Fig. 3-8 b (form a view box)

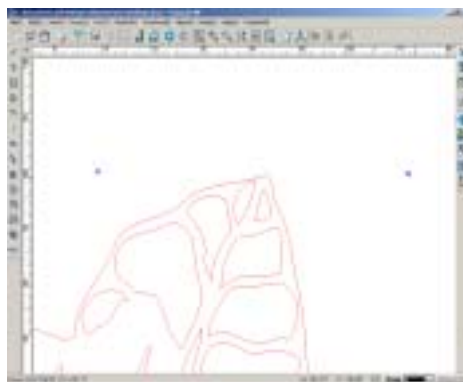



Fig.3-8 c (Zoom window)

Click the right mouse button in the drawing window to resume the original object size.

3.2.2 Zoom In

The page can be magnified through **Zoom in** function.

There are three ways to start **Zoom in** operation.

- Click the icon  on View Bar.
- Click **View->Zoom in** on the menu bar.
- Press the shortcut key **Page Down**.

The Page is magnified by two times after each operation. (Fig. 3-9)



Fig. 3-9a (original)

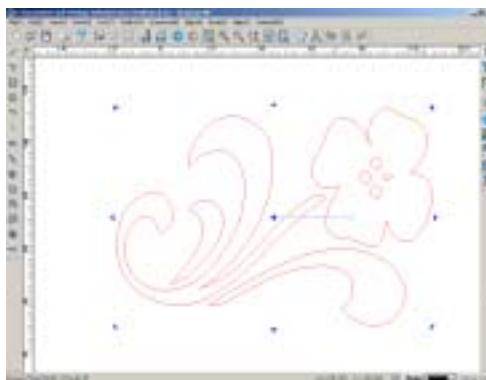


Fig. 3-9b (after zoom in operation)

3.2.3 Zoom Out

The page can be minified through **Zoom out** function. This can be achieved in any of the following ways.

- Click the icon  on View Bar.

- Click View->Zoom out on the menu bar.
- Press the shortcut key Page Up.

The Page is minified by half after each operation. (Fig 3-10)

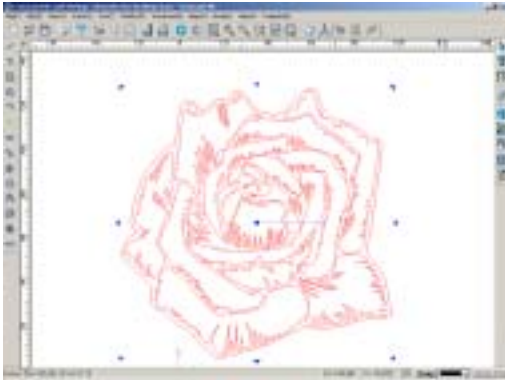


Fig. 3-10a (original)

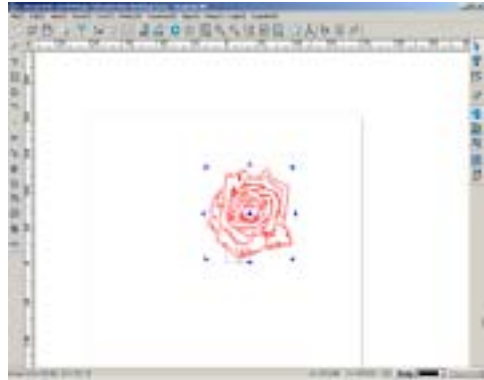




Fig. 3-10b (after Zoom out operation)

3.2.4 Dynamic Zoom

The page can be zoomed in or out through Dynamic zoom operation so that objects can be viewed in different sizes. This can be achieved by any of the following means.

- Click the icon  on View Bar.
- Click View->Dynamic zoom on the menu bar.
- Press the shortcut key F7.

Then the cursor changes into . Press the left mouse button, and the page is zoomed in by moving the mouse up, and is zoomed out by moving the mouse down. (Fig. 3-11)

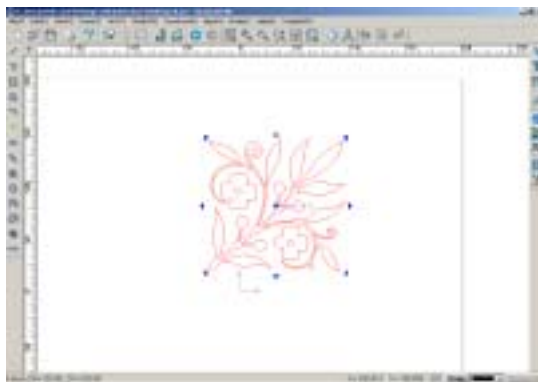


Fig 3-11a (original)



Fig. 3-11b (after zooming in)

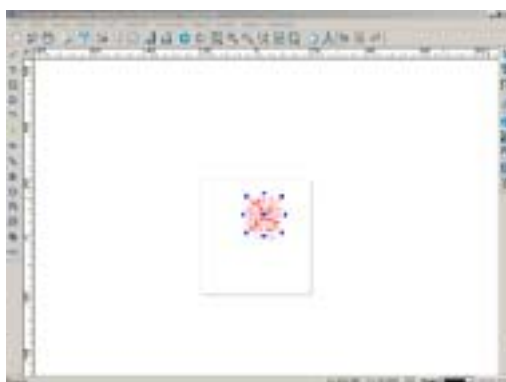



Fig. 3-11c (after zooming out)

Click the right mouse button to exit Dynamic zoom operation. The cursor changes into an arrow and the Dynamic zooming effect remains.

REMARK: If you use 3D mouse, **Dynamic zoom** operation can be achieved by rolling the mouse wheel. The page is zoomed in by rolling the mouse wheel forward and is zoomed out by rolling the mouse wheel backward.

3.2.5 Fit To All

Selected objects can be displayed in the whole window through **Fit to all** function. First select the object(s), and then select one of the following ways.

- Click the icon  on View Bar.
- Click View->Fit to all.
- Press the shortcut key F8.

The effect is shown below.

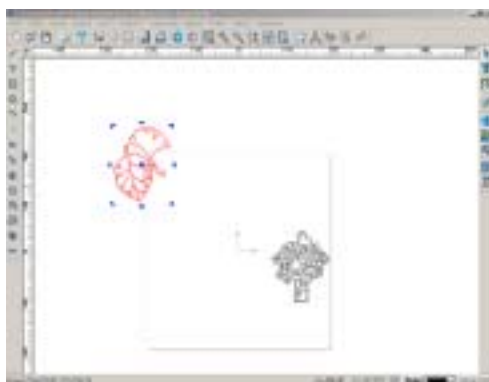


Fig. 3-12a (select an object)

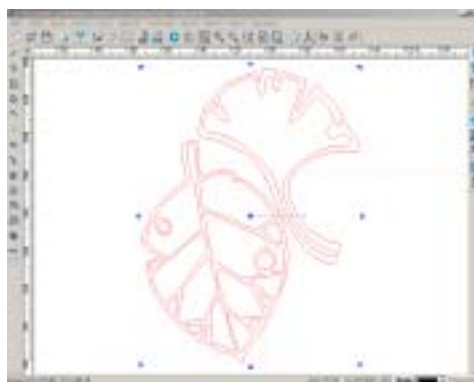


Fig. 3-12b (after Fit to all)

REMARK: If no objects are selected before enabling **Fit to all** operation, then all objects in the drawing window will be displayed in the whole view window after **Fit to all** operation. The following is an example when no object in Fig.3-17 is selected. (Fig.3-13)

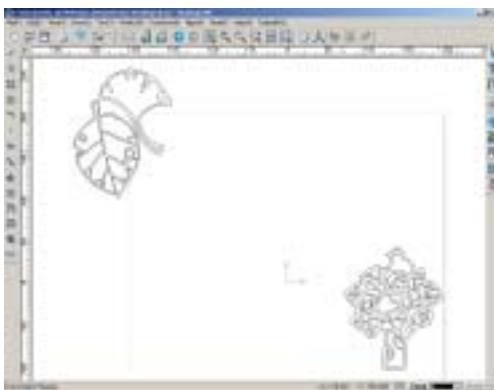



Fig. 3-13

3.2.6 Fit To Page

Object position in the page can be viewed through Fit to page function.

There are 3 ways to start this function.

- Click on the icon  on View Bar.
- Click View->Fit to page on the menu bar.
- Press the shortcut key F9.

The effect is shown below.

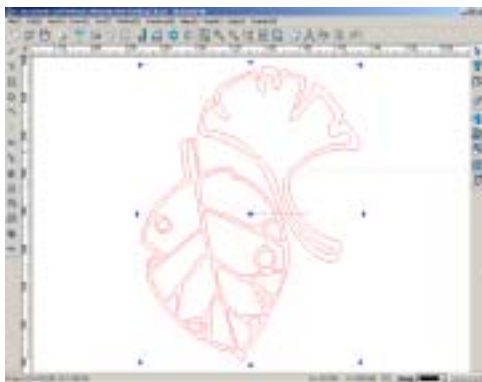


Fig 3-14a (original)

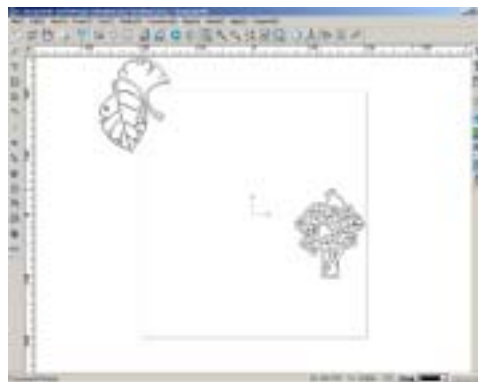




Fig. 3-14b (after Fit to page)

3.2.7 Pan View

The whole Page can be moved so that you can view different parts of the drawing. This can be achieved through any of the following ways.

- Click on the icon  on View Bar.
- Click View->Pan view in the menu bar
- Press the shortcut key F10.

Then the cursor changes into , and move the mouse with left button pressed to move the page. (Fig. 3-15)

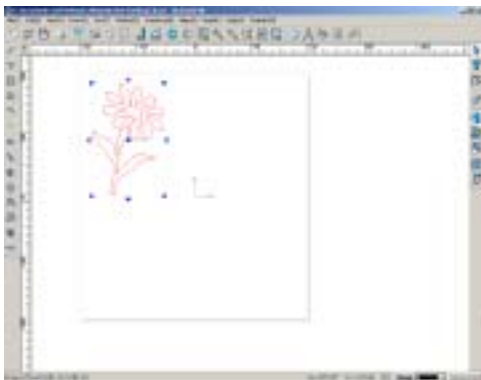


Fig. 3-15a (original graph)

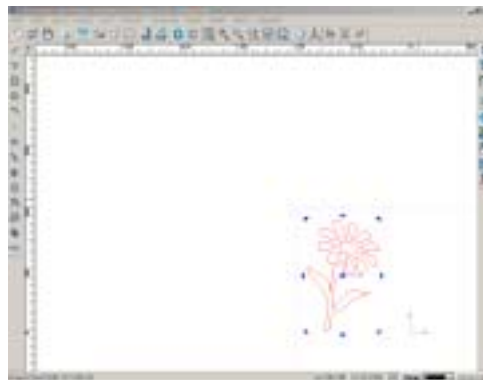



Fig. 3-15b (after Pan View)

Click on the right mouse button in the drawing window to stop the moving.

3.2.8 3D View

You can view objects in 3D view by 3D view function.

This can be achieved through any of the following ways.

- Click on the icon  in View Bar.
- Click View->3D view in the menu bar.
- Press the shortcut key F12.



After clicking on , the cursor changes into , press the left mouse button to view the object in 3D display. (Fig. 3-16)



Fig. 3-16a (original)

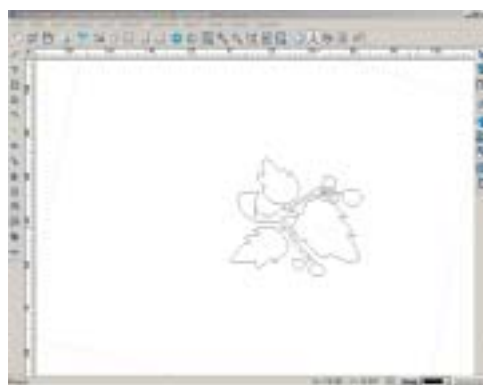


Fig. 3-16b (3D view)

In 3D view mode, click on the right mouse button to display the context menu. (Fig.3-17). Four types of 3D view functions are available in context menu : Front view, left view, top view, and ISO

view. Next we are to illustrate these functions by taking area clearance tool path as an example. (Fig. 3-18)

Quit	Esc
Zoom In	PageUp
Zoom Out	PageDown
Zoom Window	F6
Fit to All	F7
Fit to Page	F8
Dynamic Zoom	F9
Move View	F10
Front View	
Left View	
Top View	
ISO View	

Fig. 3-17 (context menu in 3D view mode)

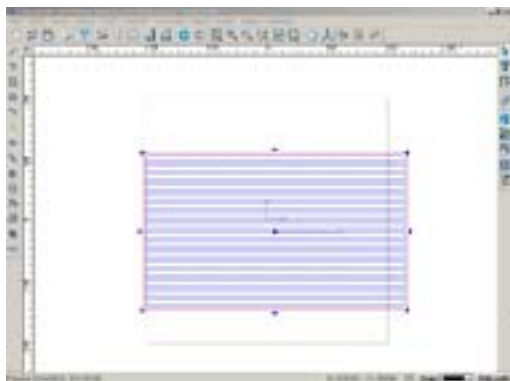


Fig. 3-18a (a rectangle's tool path)



Fig. 3-18 b (front view)



Fig. 3-18 c (left view)

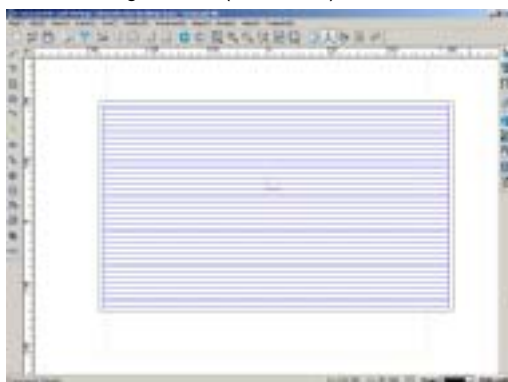


Fig 3-18d (top view)

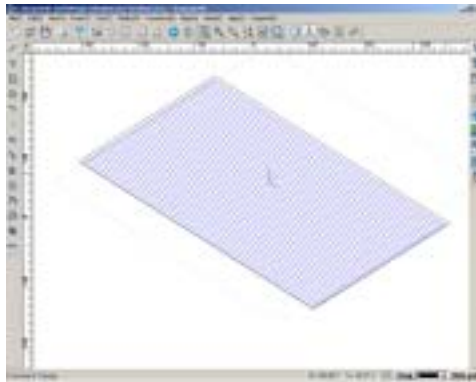


Fig. 3-18e (ISO view)

Seven viewing methods are provided in the context menu, including Zoom window, Zoom in, Zoom out, Dynamic zoom, Pan View, Fit to all, Fit to page. Now let's look at effects of these seven view functions in 3D view mode. (Fig. 3-19)

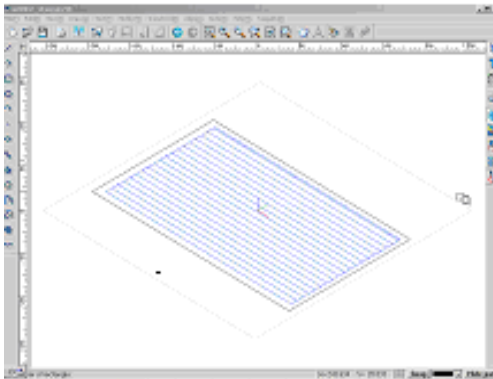


Fig 3-19a (Zoom window in 3D view)

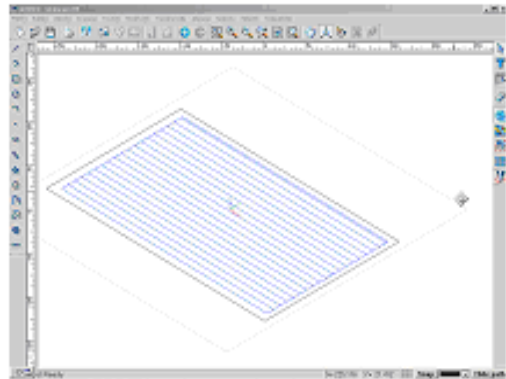


Fig. 3-19b (Zoom In in 3D view)

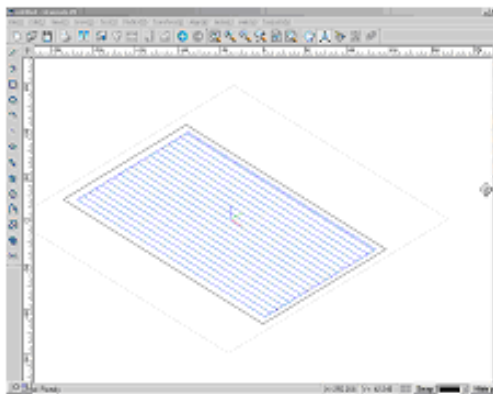


Fig. 3-19c (Zoom out in 3D view)

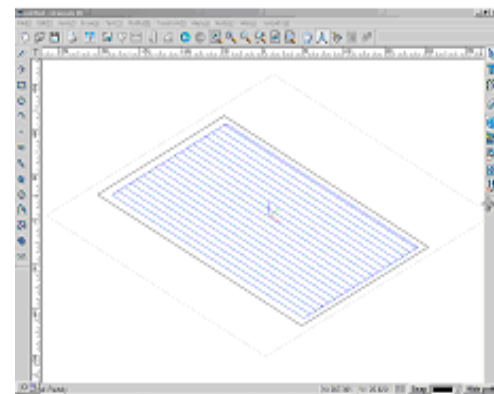


Fig. 3-19d (Fit to all in 3D view)

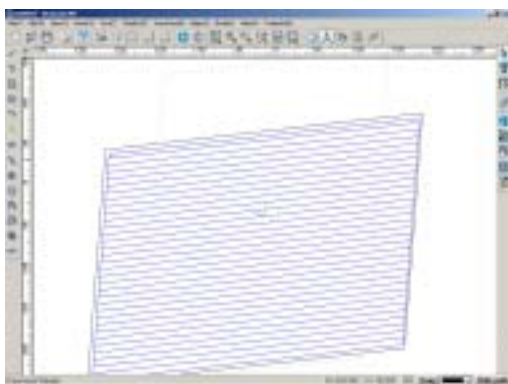


Fig. 3-19e (Fit to page in 3D view)

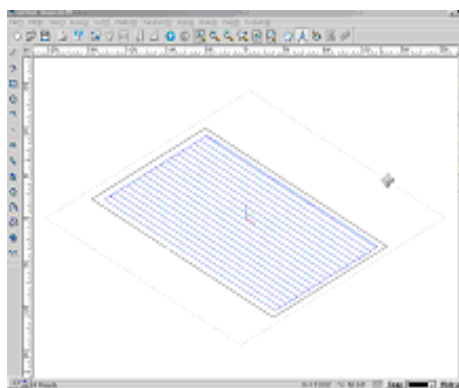


Fig. 3-19f (Pan View in 3D view)

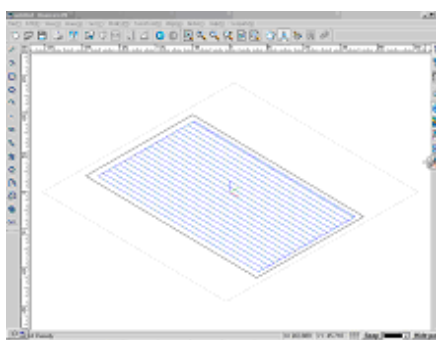


Fig. 3-19g (Dynamic zoom in 3D view)

REMARK: In the 3D view mode, press key board arrow keys to move the page up, down, right and left. Press X, Y, Z key to rotate the page along X ,Y ,Z axis respectively. During rotating, if Shift key is pressed, rotation direction is anti-clockwise.

3.2.9 Filled Display

Selected objects can be filled with color through **Filled display** function. Select **View->Filled display** to start the operation. (Fig.3-20)

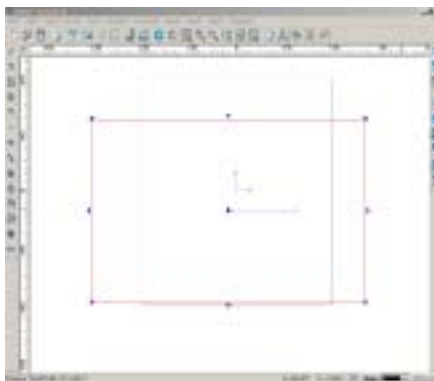


Fig. 3-20a (original)

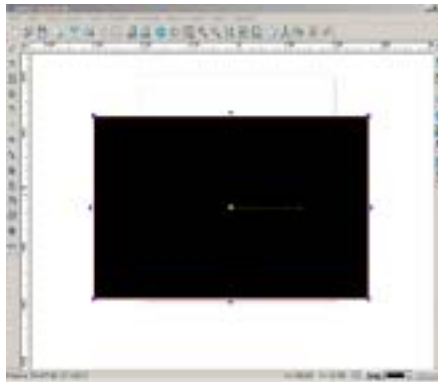


Fig. 3-20b (filled display)

REMARK: Click the color box in the status bar to display the color dialog. (Fig.3-25) Select a color to fill the object.



Fig. 3-21

3.3 Basic Settings

3.3.1 System Settings

System settings is aimed at making the operations more customizable to every users.

Click View->System settings on the menu bar, the System Settings dialog is shown. (Fig. 3-22)

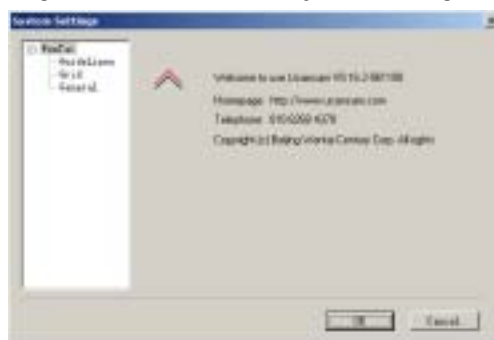


Fig. 3-22

Set up guidelines

Guidelines are vertical or horizontal lines that you can add anywhere in the drawing Window to help you measure, align, and position objects.

You can display or hide the guidelines. You can also add, delete, move, and lock guidelines in the drawing window. (Fig. 3-23)



Fig.3-23a put the mouse on the ruler

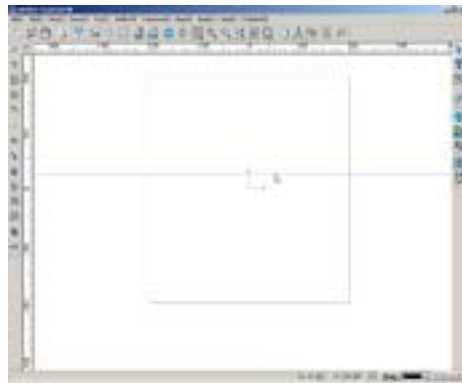


Fig. 3-23b guideline displays

After putting the cursor on the ruler, press and hold the left mouse and then drag the guide line to the desired position. (Fig. 3-24) You can drag several guidelines by following the above steps.

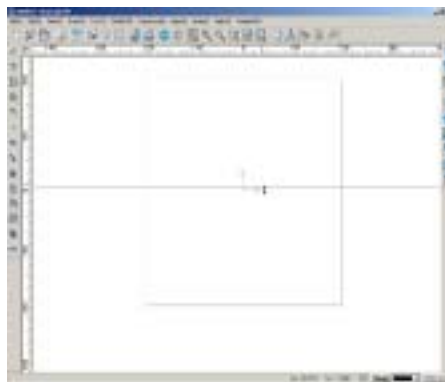


Fig. 3-24

It is very difficult to drag the guideline to a specific position with the method above, so guideline setting function is provided by Ucam V8.

This function can be started by clicking **View->System Settings** on the menu bar. Click on **Guidelines**. (Fig.3-25)



Fig. 3-25

First enter the value of the guideline coordinate, e.g.180, in the dialog. (Fig. 3-26)

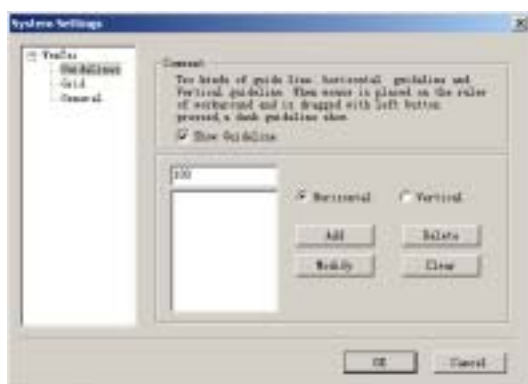


Fig. 3-26

Then, select Horizontal or Vertical before clicking on **Add**. Then a guideline is added in the working window. (Fig. 3-27)





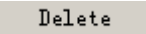
Fig. 3-27

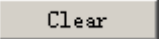
You can add more guidelines by repeating the steps above. (Fig.3-28). Click **OK**, and the added guidelines are shown in the drawing window.

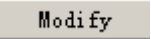


Fig. 3-28

Guidelines can also be deleted, modified or hidden.
There are three ways to delete guidelines.

- Click on the guideline and press the Delete key on the keyboard.
- Put the cursor on the guideline, and when the cursor changes into  or , drag the guide line back onto the ruler.
- Select the value of the guideline in Guidelines box, the value is covered in blue (see Fig.3-27) and then click on .

If you want to delete all horizontal and vertical guidelines, select the guidelines in Guidelines box and click on .

To modify a guideline, that is to change the position of a guideline, first select the value in the Guidelines box, and click on . Then input a new value, and the guideline position is changed.

The guidelines not used can be hidden by clicking View->Guidelines show/hide in the menu bar or by deleting “√” before Show Guidelines.

Grids setting

Grids are a series of intersecting lines superimposed on an object to help you align and position objects accurately. You can display or hide grids at any time. You can have objects align automatically with the gridlines. You can set up the grid by specifying values for the frequency, which is the number of gridlines per unit of horizontal and vertical distance, or the spacing, which is the distance between the grid lines. The style of grids can also be changed.

For more precise pixel editing at maximum zoom level, you can display a grid around each pixel.



Fig. 3-29

There are two kinds of grids in Ucamcam V8 software: rectangular (Fig. 3-30) and radial (Fig. 3-31). The space of the rectangular grids can be adjusted by setting the horizontal and vertical spaces, and spaces of the radial grids can be adjusted by setting the angle and space between every two lines.

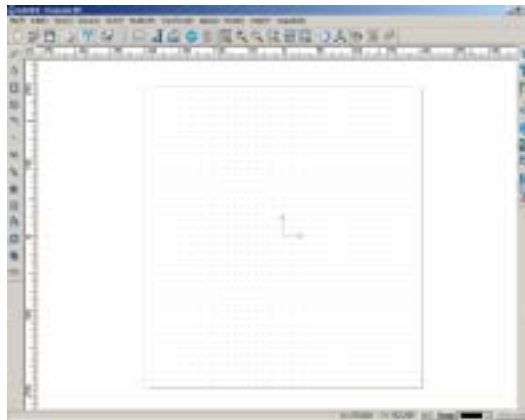



Fig. 3-30 Rectangular grids



Fig.3-31 Radial grids

The background grids can be changed by any of the following two ways.

- Add or delete the "√" before Show grids;
- Click View->Grids; or click on the icon  on Status bar.

General settings

General settings include arrow key increment step, auto save, curve accuracy, and maximum angle of centerline.



Fig. 3-32

- **Arrow key increment step**

By default, the move in X and Y direction is 1mm each time.

Rotate is for controlling the rotation of objects. Select an object, press the **Ctrl** key on the keyboard, and press the left or right arrow keys on the keyboard to rotate objects. Anti-clockwise rotation is achieved by pressing the left arrow key and clockwise rotation is achieved by pressing the right arrow key.

- **Auto Save**

Auto save ensures that no data will be lost accidentally. Objects are saved in a file named **backup.ucc** and the file is in **Ucancam Install** directory. You can set the auto save intervals by typing in a value in **Auto Save** box.

- **Curve Accuracy**


Show

Displayed curves are more accurate if smaller values are entered in **Show** box, but the accuracy has no effect on tool path.

Machining

If value of machining accuracy is smaller, tool paths calculated and the machining result are better.

Snap

Users can set the mouse snap accuracy. If the distance between the cursor and a point is less than the snap accuracy after snap function starts, the cursor changes into  and the point is snapped.

- **Maximum angle of centerline**

Maximum angle of centerline is the angle formed by any two adjacent centerlines. The centerlines can be formed only when the angle exceeds the defined value. This setting is also useful when snapping and processing midlines.

As can be seen in Fig. 3-33, when the defined angle is 30 degrees, the centerline with an angle of 45 degrees is shown as below (Fig. 3-34). But if the pre-defined angle is above 45 degrees, then the

effect is not shown.

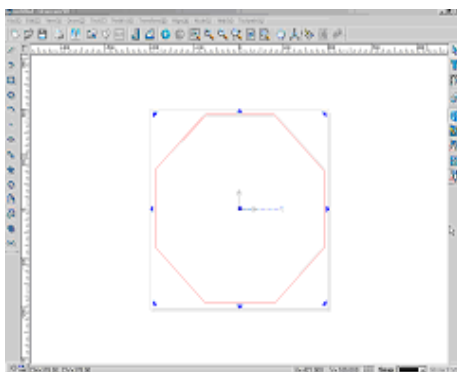


Fig 3-33

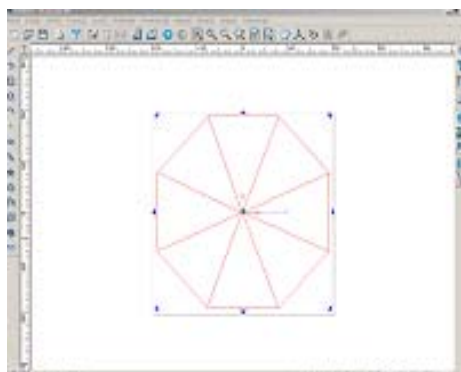


Fig. 3-34

Default settings

The default parameters can be set by clicking on **Default config.**

REMARK: It is recommended not to change the parameters unless there are special requirements.

3.3.2 Snap Function

Snap function is very helpful when we need to find perpendiculars, tangents, center lines, etc. We use the snap function to find the end points, adjacent points, midpoints, center of a circle, intersection points, perpendicular points, tangent points, quartiles and grids.

The following dialog is displayed after selecting **View->Snap Settings** command or clicking on **Snap** in the right corner of the status bar. (Fig. 3-35) Click again, and the dialog is hidden automatically.

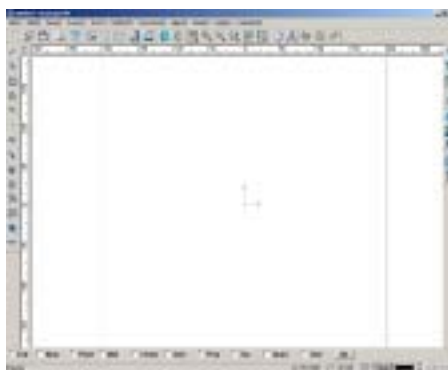


Fig. 3-35

The feature points must be selected first, otherwise the snap function will not work. Next we are going to see two examples to introduce the snap function.

Example 1

Now we want to draw a line with the rectangle's one side's mid point as an end point of the line. The following is an example.


1. First draw a rectangle.

2. Then click on **Snap** in the lower right corner of the screen. The feature point boxes are displayed in the bottom of the screen. (See below.)



3. Tick the box Mid.

4. Put one end of the line outside the rectangle, and drag the mouse onto the side of the rectangle.

When the cursor changes into “”, the midpoint of one side of the rectangle is found. (Fig. 3-36)

5. Click the left mouse button, and the end point of the line is fixed in the mid point of the rectangle's side.

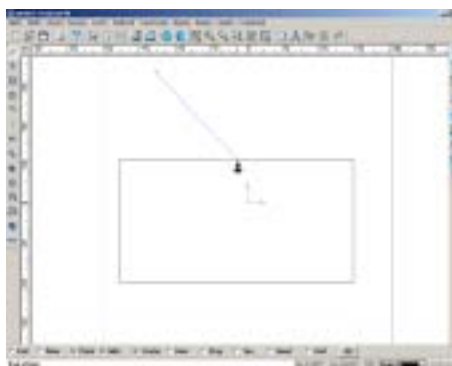


Fig. 3-36

Example 2

Draw a circle, and snap the quartile point in the same way as in example 1. The result is shown in Fig. 3-37.

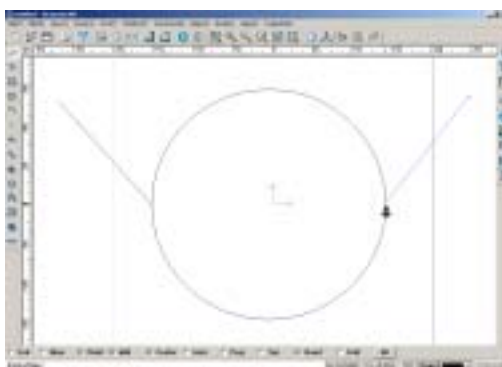


Fig. 3-37

REMARK: The above points are not necessarily fit for all curves. For example, tangency points are applied to curves like arcs and splines, but not to rectangles; perpendicular is applied to line and

rectangle but not to circle.

3.4 Other Tools

3.4.1 Show/Hide

This function is to avoid the influences of intersected or adjacent objects when drawing or editing an object.

1. Select an object.
2. Select **Edit->Hide object** on the menu bar.

Then the selected object is hidden. (Fig. 3-38b)

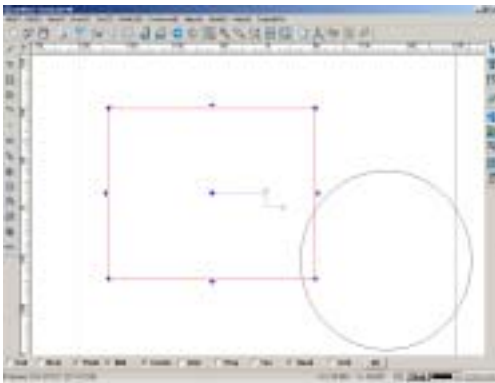


Fig. 3-38a

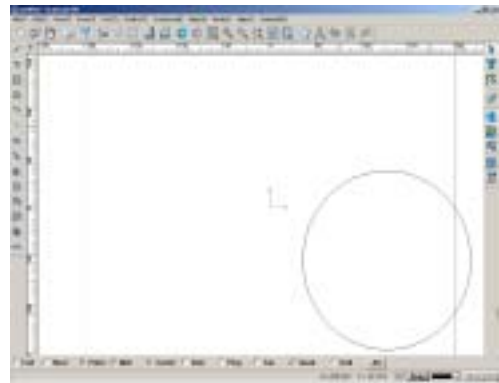


Fig. 3-38b

The hidden object reappears after clicking **Edit->Show object**. (Fig. 3-39)

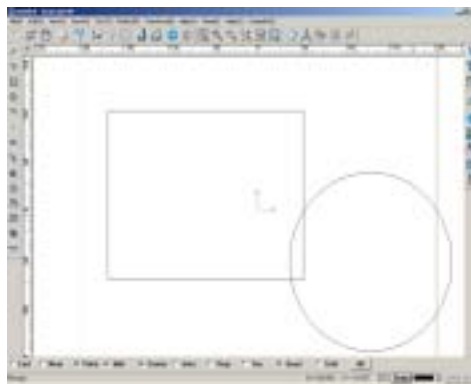


Fig. 3-39

REMARK: This function is very useful when calculating tool paths. (Please refer to Tool Path in Chapter Ten.)

3.4.2 Lock/Unlock

When Lock function is enabled, an object's position, shape and size are preserved.

To lock an object

1. Select the object to be locked.
2. Click Edit->Lock/unlock on the menu bar. (Fig. 3-40)



Fig. 3-40a (click on lock/unlock)

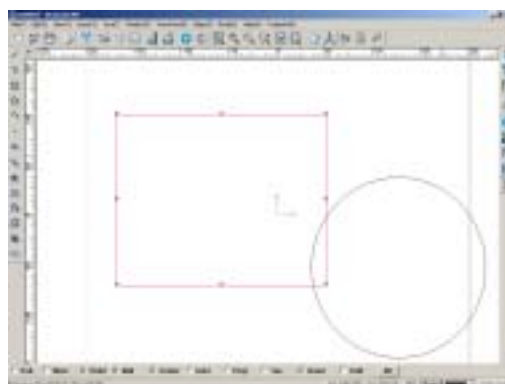


Fig. 3-40b (the rectangle is locked)

To unlock an object

1. Select the object.
2. Click Edit->Lock/unlock on the menu bar. (Fig. 3-41)

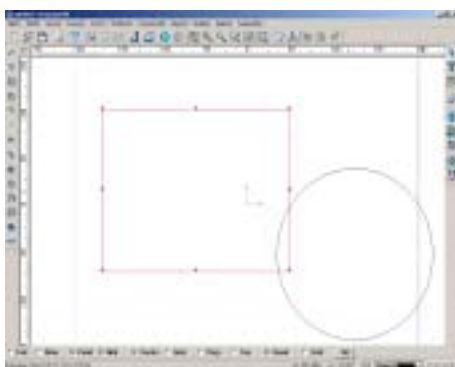


Fig. 3-41a (select the locked rectangle)

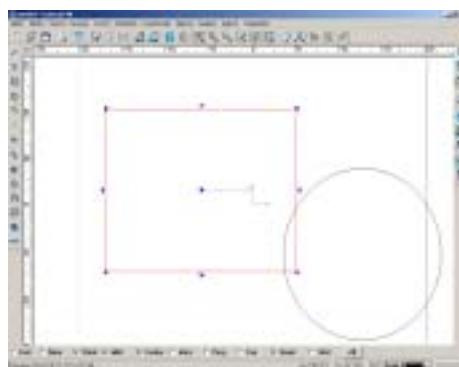


Fig. 3-41b (unlock the rectangle)

3.4.3 Redraw

You can improve the appearance of an object by removing unwanted speckles on it. You can enable this function by clicking View->Redraw on the menu bar or by pressing F5 on the keyboard. (Fig. 3-42)

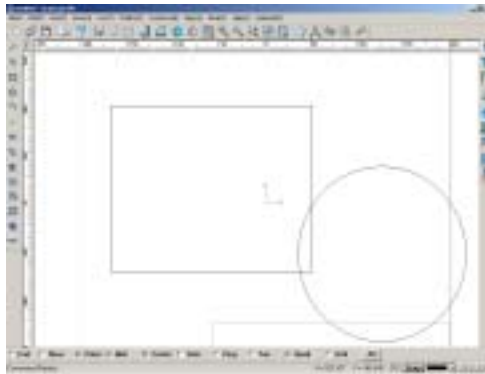


Fig. 3-42a (dotted lines are left in the lower right corner)

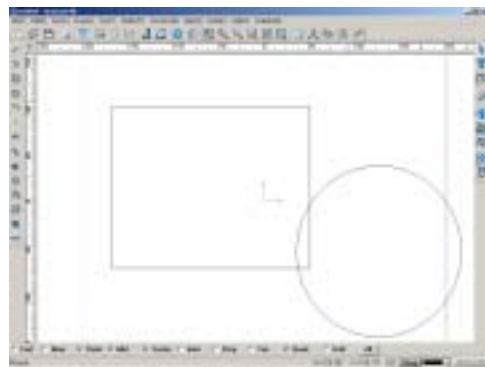


Fig 3-42b (after redraw)

3.4.4 Measuring Tools

Such functions as Distance measure, Angle measure, Perimeter measure, Area measure are available in Ucam V8.

Distance measure



1. Click on the icon  on Standard Bar, or click Help->Distance measure on the menu bar.
2. The cursor changes into .
3. Select the starting point and end point with the mouse.



Fig.3-43

REMARK: In case of measuring horizontal or vertical distances, press **Shift** key in the keyboard, and drag the mouse to move on horizontal or vertical direction.

Angle measure





1. Click the icon  on **Standard Bar**, or click **Help->Angle measure** on the menu bar.
2. When the cursor changes into , click on the angle peak and then move the cursor along one side of the angle. Click again.
3. Continue to move the cursor until the cursor reaches the other side of the angle. Click the left mouse button again.
4. Then angle degree is shown. (Fig. 3-44)



Fig. 3-44

Perimeter measure

1. Click **Help->Perimeter measure** on the menu bar.
2. The cursor changes into .

3. Move  onto the shape to be measured. (Fig. 3-45)
4. When the shape outline changes into dotted blue lines, click the left mouse button.

The value of the perimeter of the shape is shown in the status bar in the lower left corner of the screen.

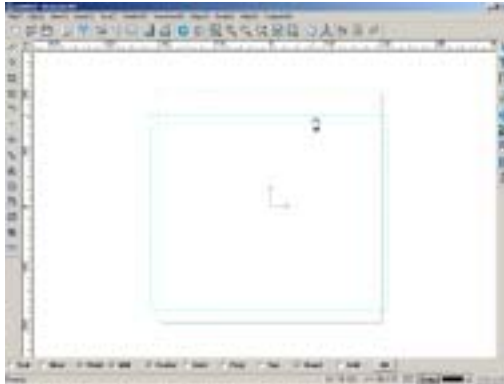




Fig. 3-45

Area measure

Area measure is for measuring the size of a shape.

1. Click **Help->Area measure** in the menu bar.
2. The cursor changes into .
3. Move  onto the shape to be measured.
4. When the shape is changed into a dotted blue line, click the left mouse button. (Fig. 3-46)
5. The value of the size of the shape is shown in the status bar in the lower left corner of the status bar.

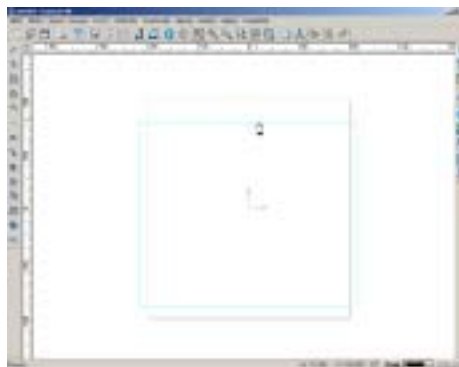



Fig. 3-46

The Maximum Inscribed Circle

1. Click Help-> The maximum inscribed circle on the menu bar, or press "Alt +5" on the keypad.
2. The cursor changes to .
3. Move the cursor to the graph to be measured, and the graph is changed into a dotted blue line.
4. Press the mouse left button.
5. The measured value is displayed in the status bar.

3.4.5 Calculator, Notepad & Microsoft Paint

Calculator, Notepad and Microsoft paint are available in Ucamcam V8 to make your operation easier.

Calculator

Calculator can be enabled after clicking Help->Calculator on the menu bar. (Fig. 3-47)

Notepad

Notepad can be enabled after clicking Help->Notepad. (Fig. 3-48)

Microsoft paint

Microsoft paint can be enabled after clicking Help->Microsoft paint on the menu bar. (Fig.3-49)



Fig. 3-47



Fig. 3-48

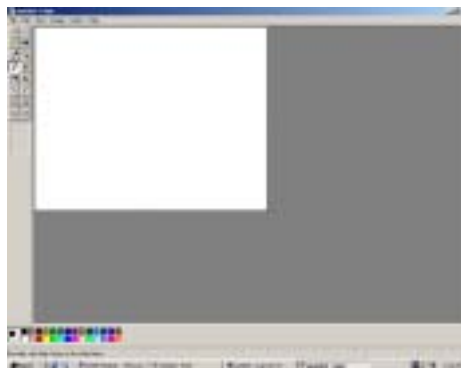


Fig. 3-49

3.4.6 Help

Ucancam V8 offers a variety of ways to help you learn the application.

- User manual
- On line technical support
- Help available in the software

To use Help

1. Click Help->Help in the menu bar.
2. The Help dialog displays. (Fig. 3-50)



Fig. 3-50

3.4.7 About Ucancam

The information about Ucancam V8 software is available for users to know more about Ucancam V8.

1. Click Help->About Ucancam on the menu bar.
2. The dialog About Ucancam is displayed. (Fig. 3-51)



Fig 3-51

The dialog is closed by clicking  or pressing the Enter key on the keyboard.

CHAPTER FOUR DRAWING SHAPES

Line, arc, circle, ellipse, Bezier curve, wavy line, combine curve, points, rectangle, star, spiral and regular polygons can be created and drawn in Ucamcam V8.

The following are the main features in Ucamcam V8.

- Point coordinates can be numerically input.
- Automatically snap end points, midpoints, intersection points, tangency points, and other feature points.
- Editing functions such as delete, offset, cut and trim, and Boolean operation functions such as join, common, not common and subtract are available.
- Transformation tools like move, rotate, mirror, scale and aligning tools such as horizontal spacing, and make the same size are available.
- Useful node editing tools.

This chapter is devoted to a general introduction of creating and drawing geometrical shapes and using the symbol library. Objects with various shapes can be created after reading this chapter.

4.1 Create simple shapes

You can create simple shapes by entering coordinates. The origin (0,0) is in the center of the interface.

Absolute coordinate: is to fix a point at a certain position by entering two values of X and Y axis coordinates.

Relative coordinate: is to fix a point at a certain position by entering two values of X and Y axis coordinates, with another point as the origin. The two values represent the distance of the new point from the other point on X and Y axis.

4.1.1 Line

1. Line

Method 1


1. Click the shortcut icon  on **Curve Bar**, or click **Draw ->Line->Line** in the menu bar.
2. The words **Start of Line** are shown in the status bar in the lower left corner.
3. Input a point's coordinates value, e.g. 10,10, and press **Enter** key.
4. Input a point's coordinates value after the screen displays **end of line** in the status bar.
5. Press the **Enter** key and a line is created.



Fig. 4-1

Method 2


1. Click Draw ->Line->Line in the menu bar.
2. Click in the drawing window to select the position of the starting point and end point of the line.
3. You can reshape the line by transformation tools, such as moving, rotating, scaling etc. Detailed introduction to these transformations will be given in the following chapter.

REMARK: Horizontal line and vertical line can be drawn by pressing the **Shift** key while moving the cursor. A coordinate (X, Y) represents a point position, "X " and "Y" are separated by a comma. In Ucamcam V8, you will need to input coordinate value in many operation.

When you need to draw a precision curve, it is suggested to use method 1 to input point's coordinates.

2. Polyline

Method 1

1. Click the shortcut icon  on Curve Bar, or click Draw->Line->Polyline in the menu bar.
2. Input polyline's points respectively according to prompt instructions in the status bar.
3. Click the right mouse button to finish this operation and a polyline is created.

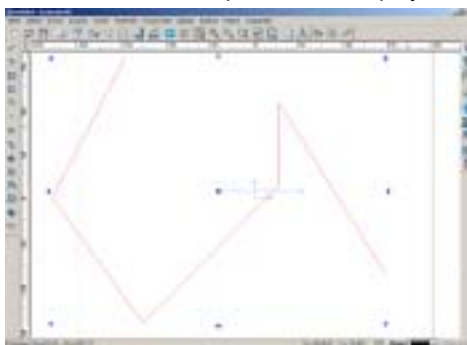


Fig. 4-2

Method 2

You can also just click in the drawing window to define the points of the polyline. You can end the operation by clicking the right mouse button.

REMARK: Horizontal or vertical polylines can be drawn by pressing the **Shift** key while moving the cursor.

3. Double Polyline

You can draw two parallel lines at a time with **Double Polyline**.

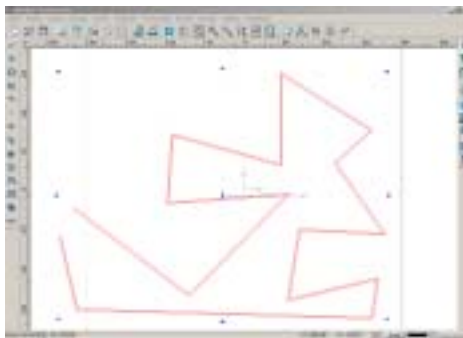



Fig. 4-3

4.1.2 Arc**1. Three-points****Method 1**

1. Click the shortcut icon  on **Curve Bar**, or click **Draw->Arc-> 3 Points** on the menu bar.
2. Input three points coordinates respectively in the status bar and press **Enter**.

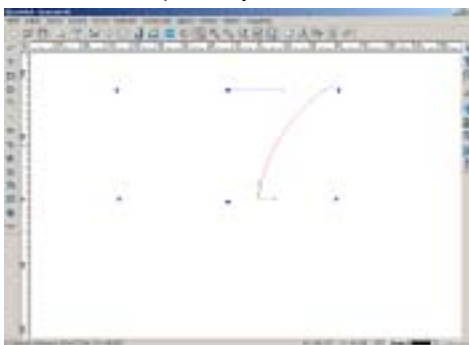


Fig. 4-4

Method 2

1. Click **Draw->Arc-> 3 Points** on the menu bar.
2. Click in the drawing window to fix the position of the three points of the arc.

2. Center, start, end

1. Click Draw->Arc->Center, start, end in the menu bar.
2. Input the coordinate in the status bar and press Enter.

Remark: Center means the center of the circle the arc is on.

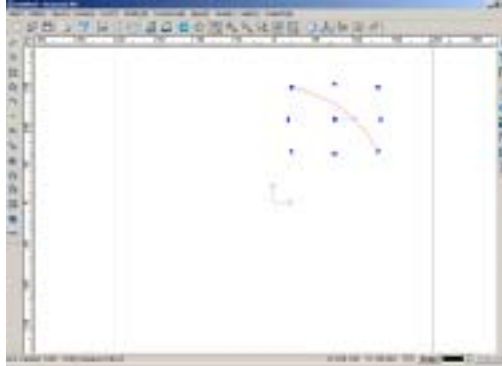


Fig. 4-5

Drawing an arc by center, start, end command is the same as drawing a 3-point arc, and the only difference is that the starting point is different. In Center, start, end, the first point is the center of the circle, the second point is the starting point of the arc, and the third point is the end point of the arc.

3. Start, end, direction

When applying this method while drawing an arc, the first point is the starting point of the arc, the second point is the end point, and direction is the end point tangent.

4. Start, end, radius

The first point is the starting point of the arc, the second point is the end point of the arc and the third step is to define the radius of the circle the arc is on.

After inputting the values in the status bar, press Enter key to validate the operation.

5. Tangential Arc

You can draw a arc by a tangent. Follow the steps below.

1. Draw a circle.
2. Click Draw->Arc->Tangential Arc in the menu bar.
3. The cursor becomes a pen. Drag the pen to the circle, and a blue line appears. (Fig. 4-6)
4. Choose the position you want to put the arc, and then click the mouse button.
5. Then drag the pen to a specific position according to the radius of the arc to be created. Then click again to fix the radius.
6. Move the pen to define the arc length, and then click the mouse button to finish.

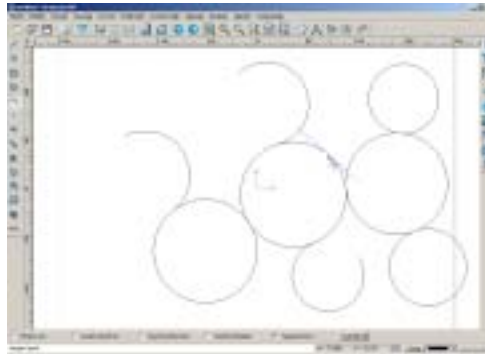



Fig. 4-6

4.1.3 Circle

Method 1

1. Click the shortcut icon  in Curve Bar, or click Draw-> Circle on the menu bar.
2. The words Center of circle are displayed in the status bar.
3. Input a coordinates value, e.g.10,10.
4. Press the Enter key, and the position of the center of the circle is fixed.
5. Input the value of the radius of the circle.
6. Press Enter key, and a circle is drawn.

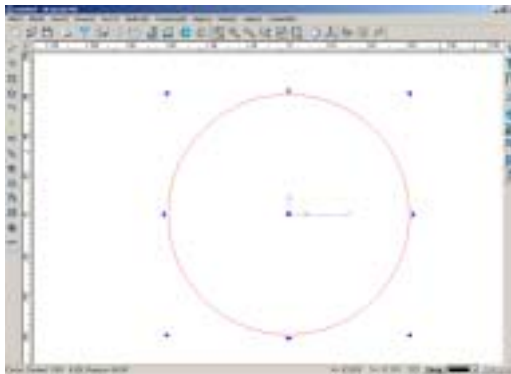



Fig. 4-7

Method 2

1. Click Draw-> Circle on the menu bar.
2. Click in the drawing window to select a point as the center of the circle.
3. Move the mouse to define the radius of the circle.
4. Click the left mouse button to finish drawing the circle.

4.1.4 Ellipse

Method 1

1. Click the shortcut icon  on Curve Bar.
2. Select **Draw->Ellipse** on the menu bar.
3. The words **Center of ellipse** are shown in the status bar.
4. Input a coordinate value to fix the position of the center of the ellipse.
5. Enter a coordinate value to define the end point of the first axis of the ellipse.
6. Enter the coordinate value of the length of the other axis of the ellipse.

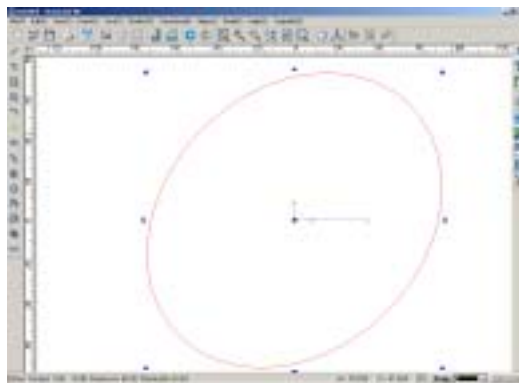



Fig. 4-8

Method 2

1. Select **Draw->Ellipse** on the menu bar.
2. Select a point as the center of the ellipse by clicking in the drawing window.
3. Click in another position to fix one axis of the ellipse.
4. Click in a third point to define the radius of another axis of the ellipse.

4.1.5 Spline

Method 1

1. Click the shortcut icon  on Curve Bar, or click **Draw->Spline** on the menu bar.
2. Input coordinate value respectively by following the instructions in the status bar,.
3. Finish the operation by clicking the right mouse button in the drawing window.

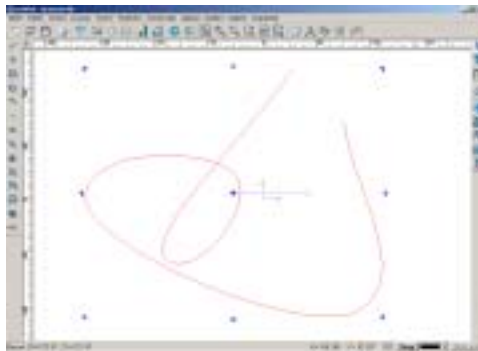



Fig. 4-9

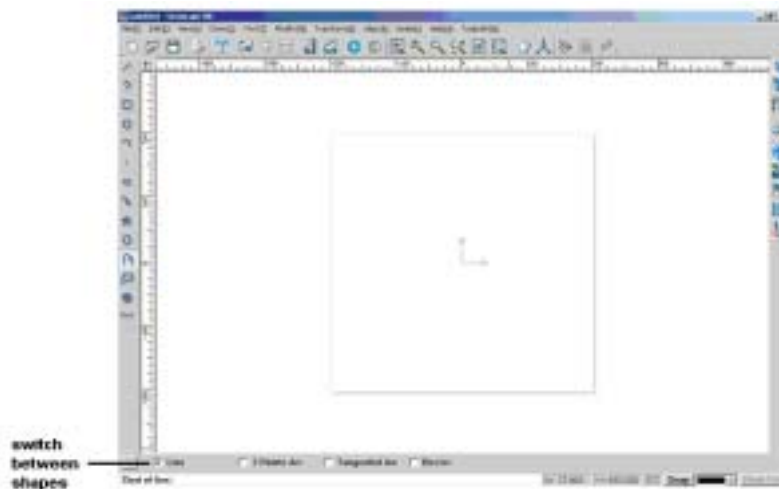
Method 2

1. Select **Draw->Spline** on the menu bar.
2. Select points respectively by clicking the left mouse button in the drawing window.
3. Finish this operation by clicking the right mouse button.

4.1.6 Combine Curve

Combine curve is consisted of lines, arcs and splines. You can switch between line, 3 Point Arc, Tangential Arc and Spline drawings.

1. Click the shortcut icon  on **Curve Bar** , or click **Draw->Combine curve** on the menu bar.
2. By default, the first shape is a line. You can switch between these shapes by clicking on options in the status bar. A combine curve example is shown in Fig. 4-11.



F 4-10

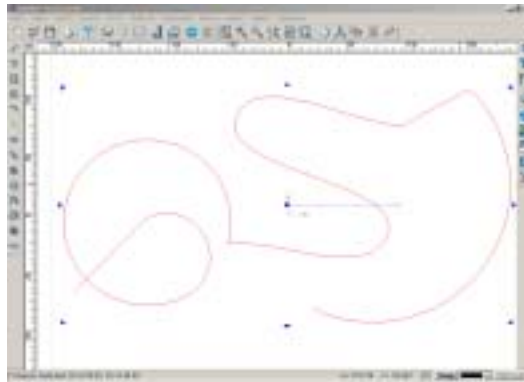



Fig. 4-11

4.1.7 Points

Method 1

Click the icon  on Curve Bar, or click **Draw->Point** on the menu bar.


Several points can be drawn at a time by inputting the coordinates of the points by following instructions in the status bar.

Method 2: Click **Draw->Point** on the menu bar, or select points by clicking in the drawing window.

4.1.8 Rectangles

1. Rectangle

Method 1

1. Click the shortcut icon  on Curve Bar, or click **Draw->Rectangle->Rectangle** in the menu bar.

2. Input coordinate value by following instructions in the status bar.

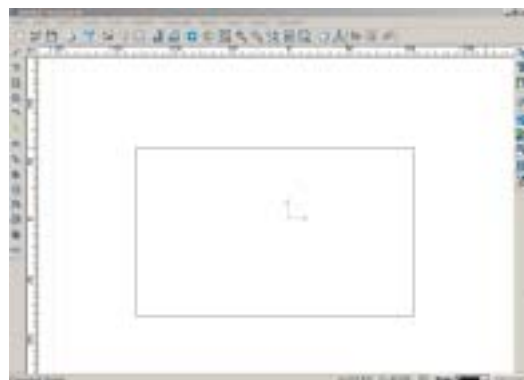


Fig. 4-12

Method 2

1. Click Draw->Rectangle->Rectangle on the menu bar.
2. Select two points by clicking in the drawing window.
3. Finish this operation by clicking the right mouse button.

2. Fillet rectangle

There are two ways to draw a fillet rectangle:

Method 1

1. Click Draw->Rectangle ->Fillet Rectangle on the menu bar.
2. Input two corner points' coordinates and radius of fillet.



Fig. 4-13

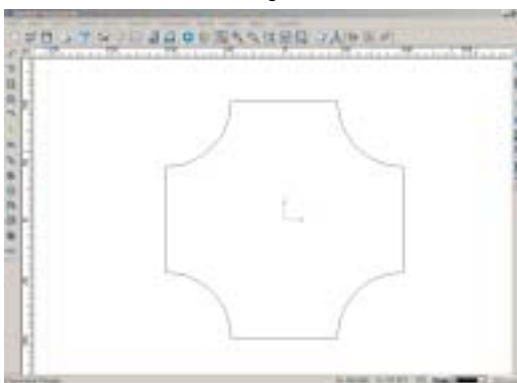


Fig. 4-14

Method 2

1. Click Draw->Rectangle ->Fillet Rectangle on the menu bar.
2. Select two points as two of the rectangle's corners by clicking in the drawing window.
3. Get the correct radius by moving the mouse and clicking the left mouse button.

REMARK: When using Method 1 to create a Fillet rectangle, you can move the cursor to get two different results.

3. Chamfer rectangle

Method 1

1. Click Draw->Rectangle->Chamfer rectangle in the menu bar.
2. Input points' coordinates and chamfer value.

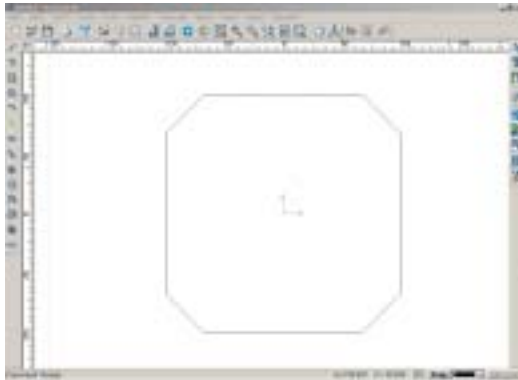


Fig. 4-15

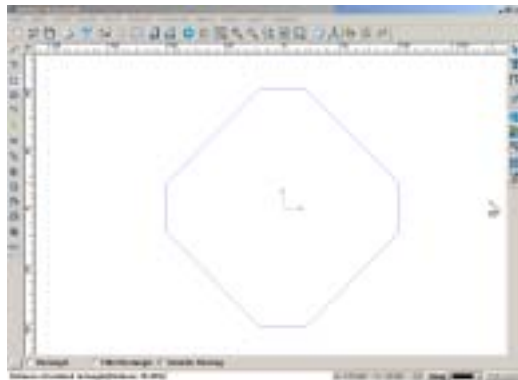


Fig. 4-16


Method 2

1. Click Draw->Rectangle->Chamfer rectangle in the menu bar.
2. Select two points as a rectangle's corners by clicking in the drawing window.
3. Get a chamfer distance by clicking in the drawing window.

The result is shown in Fig. 4-13. When moving the mouse to extreme points, the result is shown in Fig. 4-14.

4.1.9 Star

Method 1

1. Click the shortcut icon  in Curve Bar, or click Draw->Star in the menu bar.
2. Input number of sides, center point coordinates, first radius and second radius of star

respectively by following instructions in the status bar.

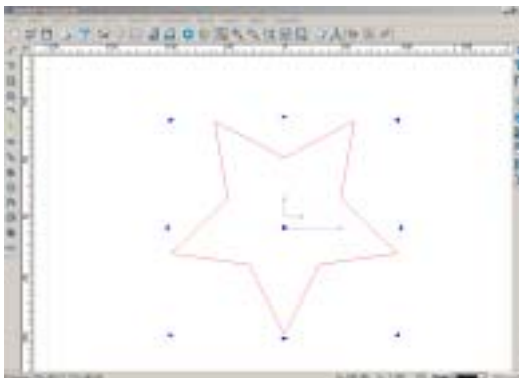


Fig. 4-17

Method 2


1. Click Draw->Star in the menu bar.
2. Input the number of sides in the status bar.
3. Select the center, first radius and second radius of the star by clicking in the drawing window.

The larger radius between first radius and second radius is regarded as star's outer radius. You can select one radius as star's outer or inner radius according to your needs.

REMARK: The Ratio of inner radius to outer radius of a standard star is 1:2.

4.1.10 Regular Polygon

Method 1

1. Click the shortcut icon  on Curve Bar, or click Draw->Regular polygon in the menu bar.
2. Input the number of sides, the center point and radius respectively by following instructions in the status bar.

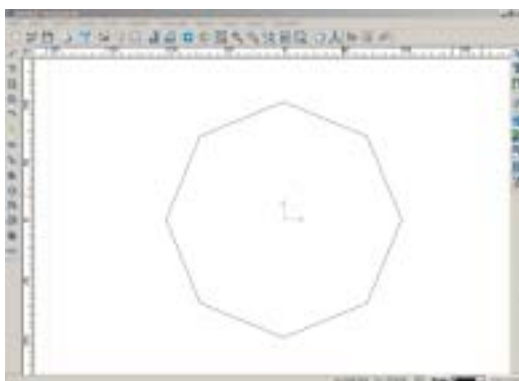


Fig. 4-18

Method 2


1. Click Draw->Regular polygon in the menu bar.
2. Input the number of sides in the status bar.
3. Select the center point of the regular polygon and radius of polygon by clicking in the drawing window.

4.1.11 Arrow

The shape of an arrow is determined by four feature points. (Fig.4-19).

There are two ways to draw an arrow.

Method 1

1. Click the shortcut icon  on Curve Bar, or click Draw->Arrow in the menu bar.
2. Input four feature points' coordinates respectively by following instructions in the status bar.

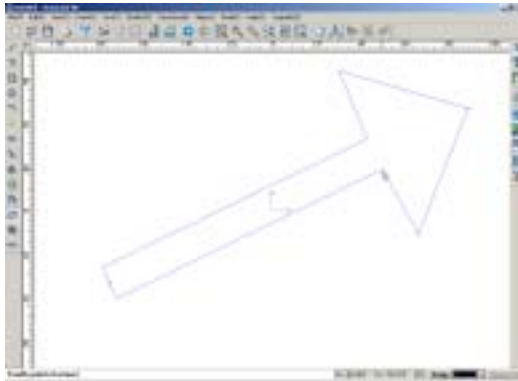



Fig. 4-19

Method 2

1. Click Draw->Arrow in the menu bar.
2. Select four points by clicking in the drawing window.
3. Finish the operation by clicking the right mouse button.

4.1.12 Spiral

You can draw two types of spirals in Ucam V8: Archimedes spiral and logarithm spiral. The distance between every two windings of Archimedes spiral is the same. The distance between every two windings of logarithm spiral increases as the number of windings increases.

1. Click the shortcut icon  on Curve Bar, or click Draw->Spiral in the menu bar.
2. The Spiral Parameters dialog (Fig. 4-20) is displayed.

Archimedes spiral

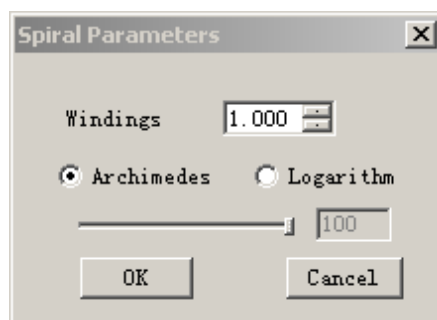


Fig. 4-20

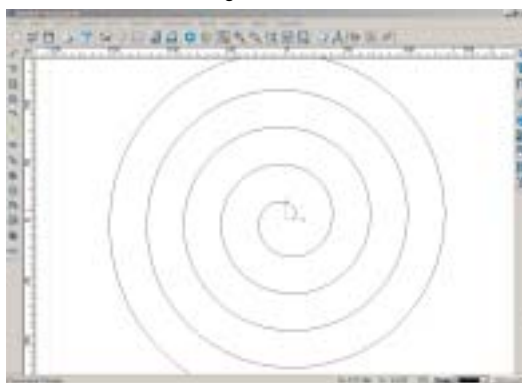


Fig. 4-21

Logarithm spiral

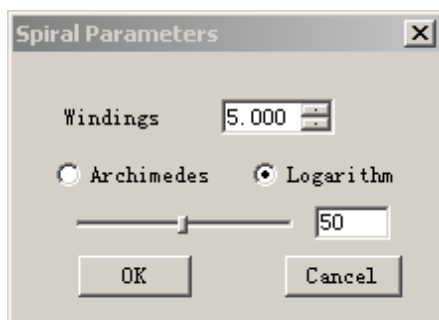


Fig. 4-22

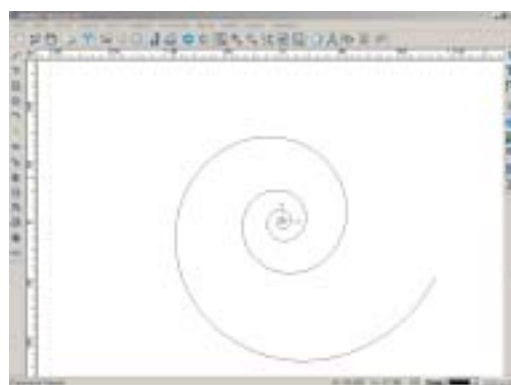


Fig. 4-23

When inputting data that is out of range, a warning message is displayed.

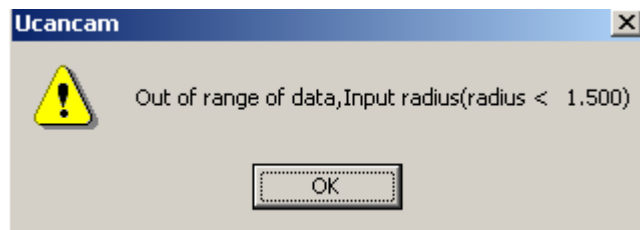


Fig. 4-24

4.1.13 Wavy line

Various types of wavy lines such as sinusoids, swing curves, wavy lines, trapezium polylines, and wave polylines are provided in Ucancam V8.

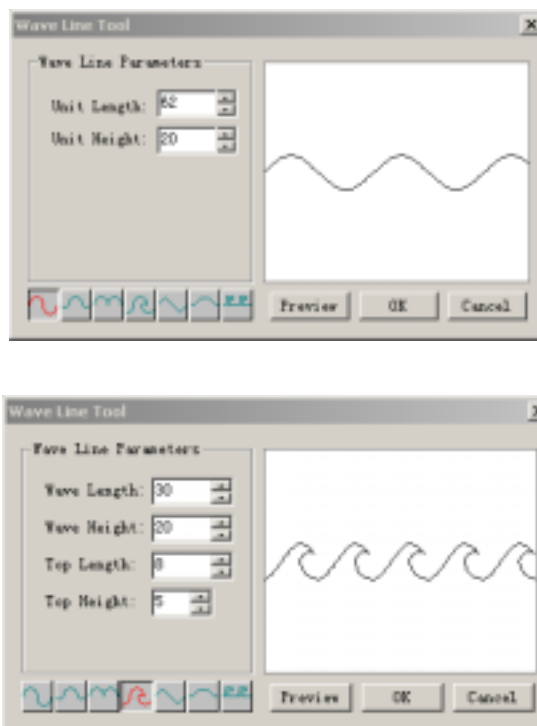


Fig. 4-25

Wavy line parameters :

Unit length: is the length of each wave

Unit height: is the vertical distance between the wave top and the wave bottom.

Top length: is the length of the wave top

Top height: is the height of the wave tip

1. Click the shortcut icon , or click Draw->Wivy Line in the menu bar.

2. The dialog (Fig. 4-25) is displayed.
3. Select one type of wavy line.
4. Set the parameters and click on OK.

Then a wavy line is drawn. The length and height of the wavy line can be adjusted, and the shape of the wavy line can be previewed. (Fig. 4-26)

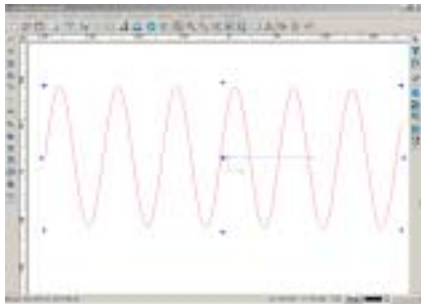


Fig. 4-26a

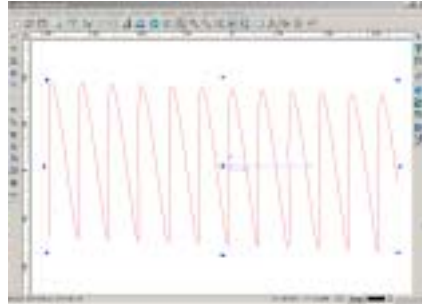


Fig. 4-26b

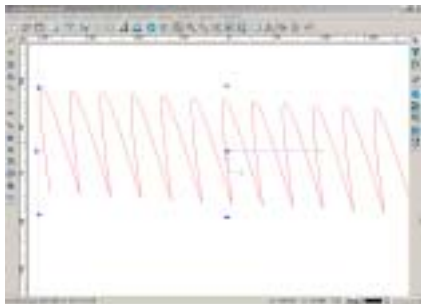


Fig. 4-26c

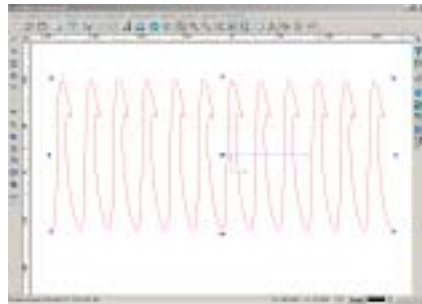


Fig. 4-26d

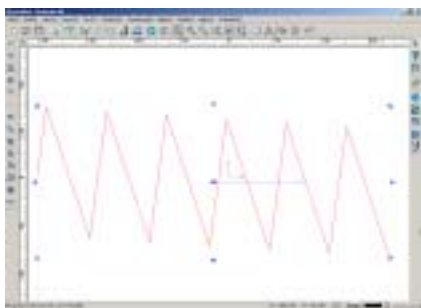


Fig. 4-26e

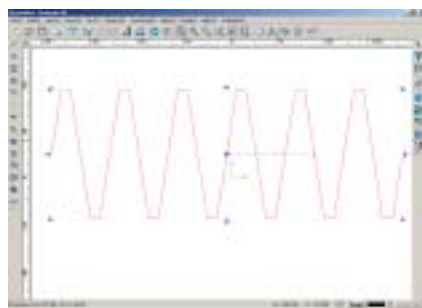


Fig. 4-26f

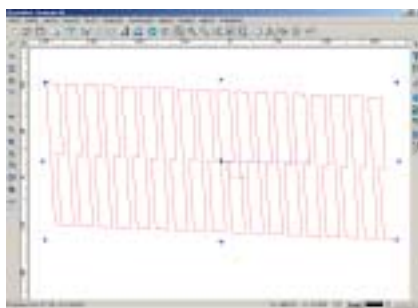


Fig. 4-26g

4.1.14 Hand Draw

Besides the shapes above, you can also use your imagination to create any freeform shapes by Hand Draw. Follow the steps below.

1. Click Draw->Hand Draw in the menu bar.
2. Click and hold the left mouse button to draw freeform shapes.

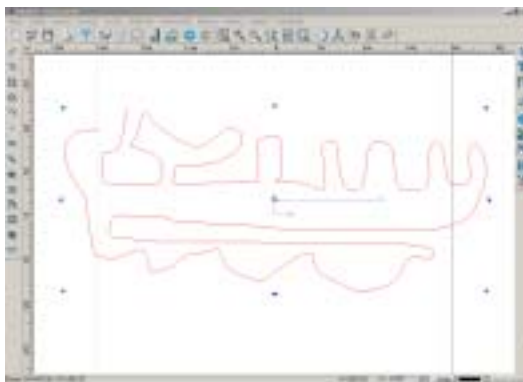


Fig. 4-27

4.1.15 Bounding Box

Adding a bounding box to an object is useful for machining. Sizes of a bounding box are changed by parameter settings according to your needs.

1. Select an object.
2. Click Draw->Bounding box in the menu bar.
3. The Bounding Box dialog is displayed. (Fig. 4-28)
4. Select appropriate values in the box.
5. Click on OK to finish the operation.

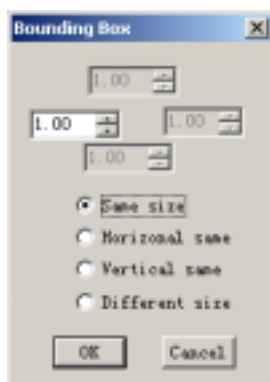


Fig. 4-28

Parameters:

Same size: The modifications of the bounding box in four directions are the same.

Horizontal same: The modifications of the bounding box in the horizontal direction are the same.

Vertical same: The modifications of the bounding box in the vertical direction are the same.

Different size: The modifications of the bounding box in four directions are different.

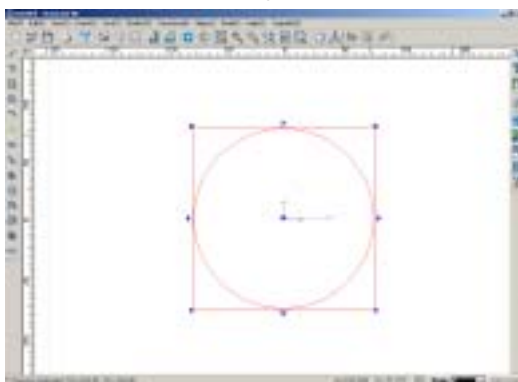



Fig. 4-29

4.2 Symbol Library

Numerous kinds of symbols are provided in Ucamcam V8, including trade marks, auto brands, animals and plants, furniture, human figures, etc. (The total number of the symbols in the symbol library is about 10 thousand.)

4.2.1 Show/Hide Symbol Library

1. Click the icon  on Editing Bar, or click Draw->Symbol library on the menu bar.
2. The Symbol Library dialog is displayed on the left of the drawing window. (Fig. 4-30)

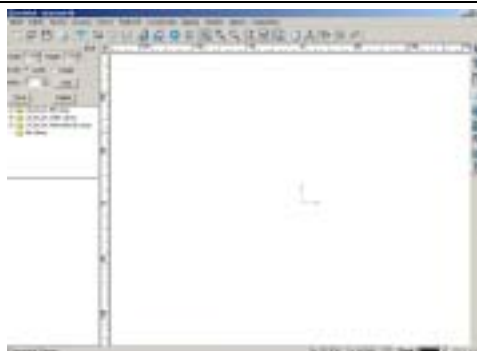




Fig. 4-30

To hide the **Symbol Library**, there are three ways

- Click  icon on **Editing Bar**.
- Click **Draw->Symbol library**.
- Click on the  button in the upper right corner of the dialog.

4.2.2 Contents in Symbol Library

Symbol Library is made up of four parts: **Ucancam 98 library**, **Ucancam Utility library**, **Ucancam International library**, and **My library**. Each of the four parts is further divided into smaller symbol libraries. Users can select the symbols from the **Symbol library** for use. (Fig. 4-31)

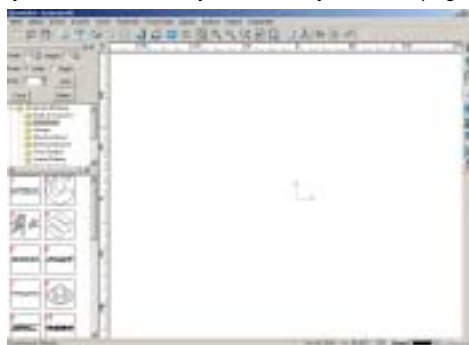


Fig. 4-31

4.2.3 Selecting A Symbol

You can browse the **Symbol library** and select a symbol which you need. All the symbols are divided into many groups according to their types.

There are two ways to insert a symbol into the drawing window: 1) click on the **Add** button in the dialog bar, or 2) insert the symbol into the drawing window by clicking on the symbol and dragging it into the drawing window. The symbol's width, height and scale base are set by entering values in the **Width** and **Height** and **Scale** boxes in the dialog.

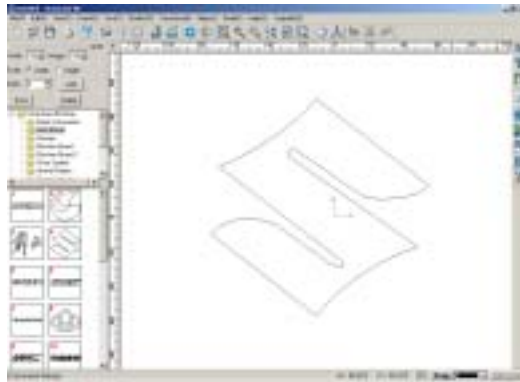


Fig. 4-32

REMARK: Because there are too many types of symbols in Symbol library, it is suggested to get familiarized with the symbols first so that it is easier to find the desired symbols in Symbol library.

4.2.4 My Library

Users can create their own symbols and save them to **My Library**.

1. Select an object.
2. Click on **Save** button on **Symbol library** dialog bar.

To delete a symbol from **My Library**

1. Click on the symbol to be deleted.
2. Click on **Delete** button in **Symbol library** dialog bar.

Other operations in **My library** are the same as the operations in the **Symbol library** before.



Fig. 4-33

REMARK: You can add or delete a symbol in **My Library**; symbols in other three symbol libraries can not be added or deleted by users.

CHAPTER FIVE OBJECT OPERATION

OBJECTS include points, lines, circles, polygons, texts, symbols, images and any other items in the drawing window.

5.1 Select An Object

5.1.1 Select With Mouse

There are three ways to select an object with mouse.

- Select an object by clicking the left mouse button
 1. Move the cursor onto an object.
 2. When the object is highlighted in dashed blue lines, click the left mouse button to select the object. The selected object is displayed in red.

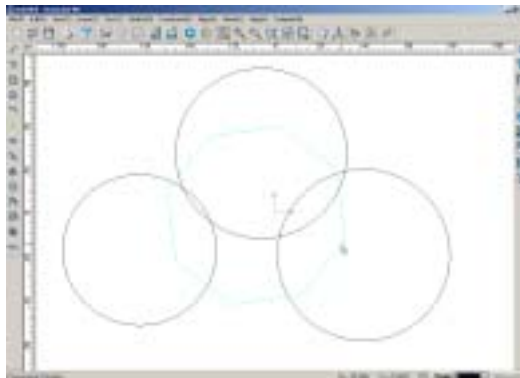


Fig. 5-1a (move the mouse onto the object)

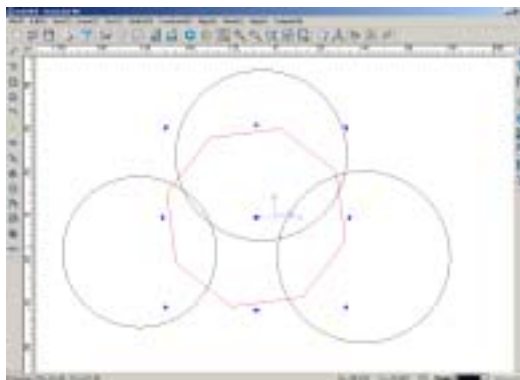


Fig. 5-1b (the object is selected)

REMARK: Hold down the **Shift** key, then click on each object you want to select, you can select multiple objects. (Fig. 5-2) To deselect an object, click on the object again. (Fig. 5-3)

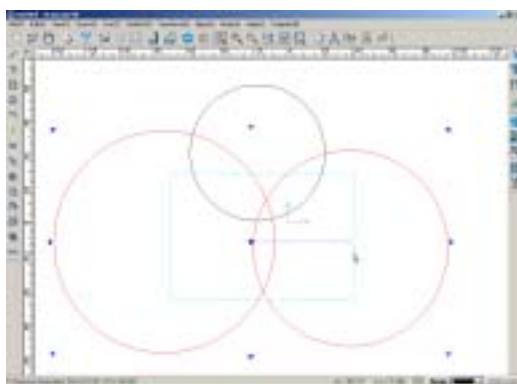


Fig. 5-2

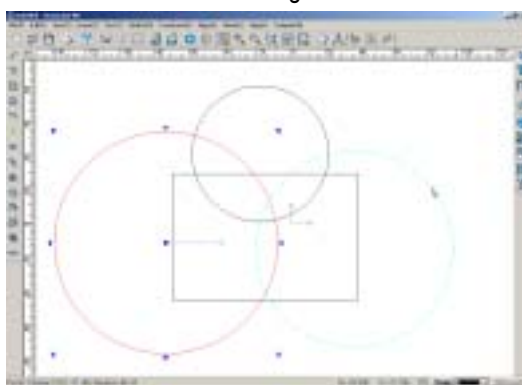


Fig. 5-3

- Select objects with a line

1. Press the Ctrl key.
2. Press and hold the left mouse button and move the mouse.
3. A blue dashed line displays in the drawing window. Objects which intersect with the line are highlighted in dashed blue lines.
4. Release the left mouse button, these objects are selected. (Fig. 5-4)

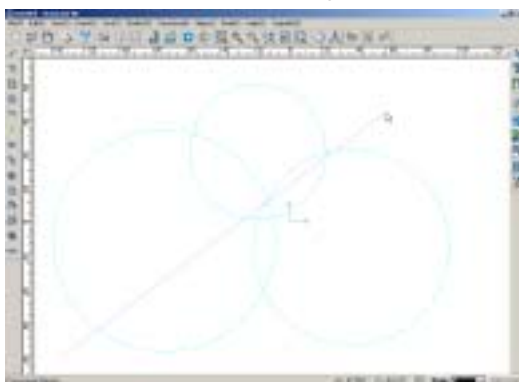


Fig. 5-4a objects are highlighted

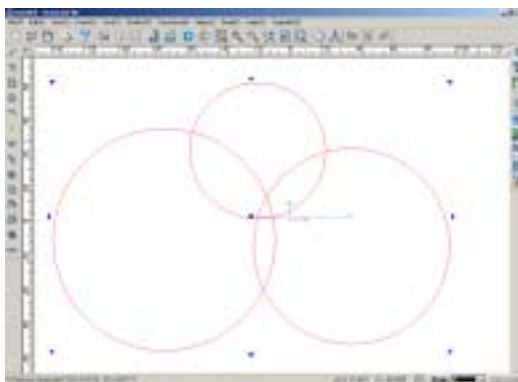


Fig. 5-4b the objects are selected

- Select objects with a rectangle

Method 1

1. Press the left mouse button and move the cursor from left to right. (Note: the moving direction is from left to right.)
2. Objects that are fully included in the blue rectangle are highlighted.
3. Release the left mouse button, and these objects are selected. (Fig. 5-5)

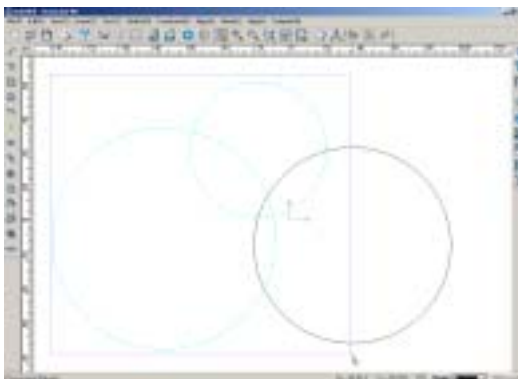


Fig. 5-5a A rectangle

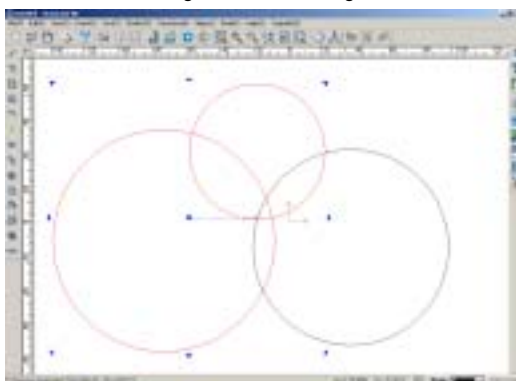


Fig. 5-5b the objects in the rectangle are selected

Method 2

1. Press the left mouse button and move the mouse from right to left. (Note: the moving direction is from right to left.)
2. Objects that intersect with the rectangle are highlighted.
3. Release the left mouse button, and these objects are selected. (Fig. 5-6)

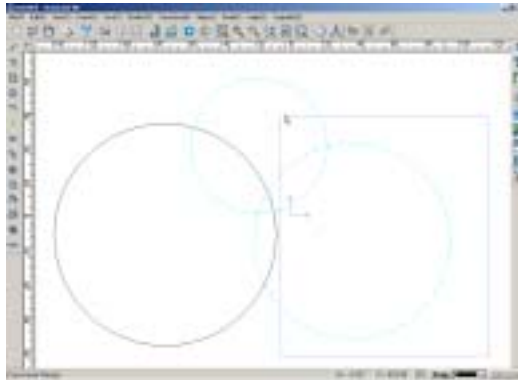


Fig. 5-6a objects highlighted

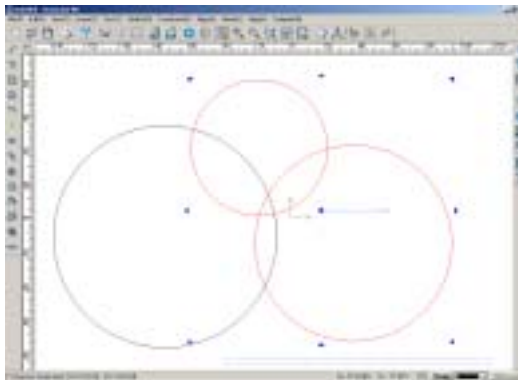


Fig. 5-6b the objects are selected

5.1.2 Select By Menu Command

1. Select all & Inverse Selection command

To select all the objects in the drawing window, select Edit-> Select All (or press shortcut key Ctrl + A). (Fig. 5-7)

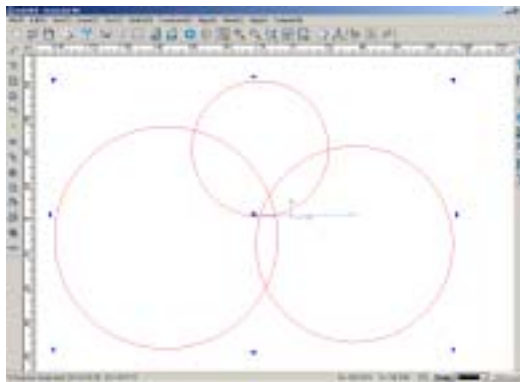


Fig. 5-7

If you select **Edit-> Inverse Selection**, then all the unselected objects are selected and all the selected objects are deselected in the drawing window. (Fig. 5-8)

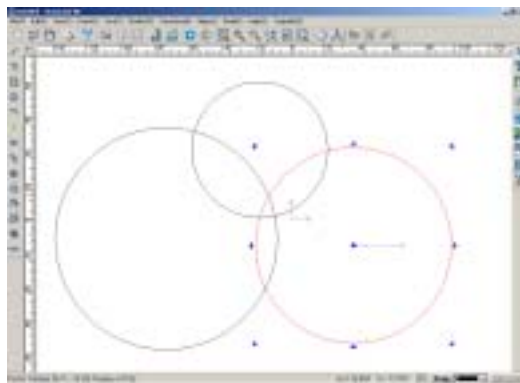


Fig. 5-8a (select the unneeded objects)

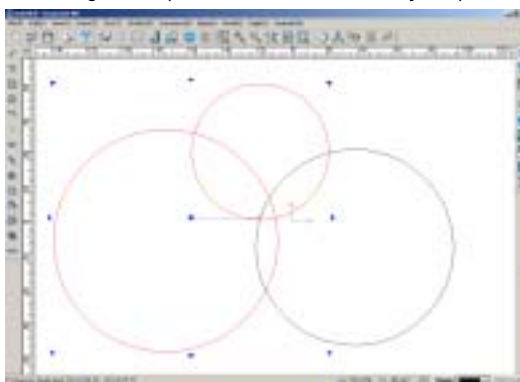


Fig. 5-8b (after inverse selection)

2. Select by Type

1. Click **Edit->Select by Type**
2. The **Select by Type** dialog is displayed.

3. Select one type or set parameters if necessary, objects of the selected type are selected in the drawing window.

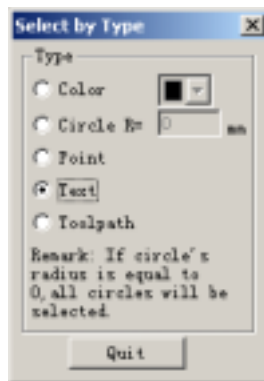


Fig. 5-9

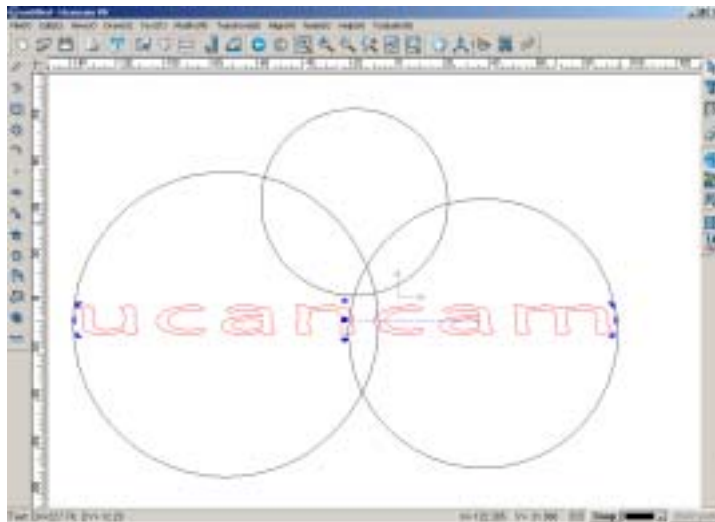


Fig. 5-10 (select the text in the drawing window)

5.2 Transform Operation

5.2.1 Move

- Move Relatively

1. Select the object to be moved.
2. Click Transform->Move Relatively in the menu bar.
3. A dialogue box displays. (Fig. 5-11)
4. Enter the value of the moving distance (horizontal and vertical; UNIT: mm), and then click on OK. The object is then moved.

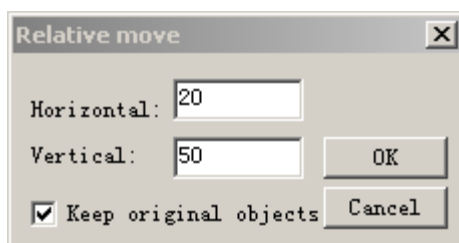


Fig. 5-11

- **Move Absolutely**

1. Select the object to be moved.
2. Click Transform->Move Absolutely in the menu bar.
3. Enter the starting point coordinate in the blank area of the status bar. (e.g. 0,0), and then enter the end point coordinate.

The object is moved to a specific position.

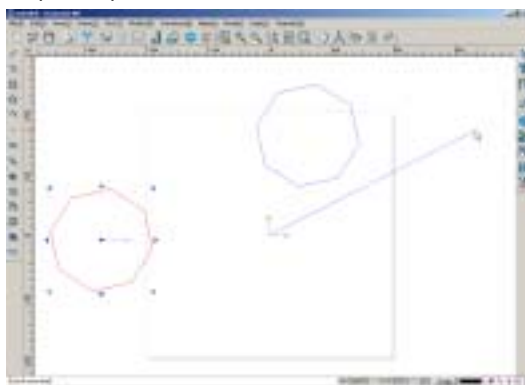


Fig. 5-12

5.2.2 Scaling

To scale an object

1. Select an object.
2. Move the cursor onto the arrows in the four corners of the object.
3. When the cursor changes into “↖” or “↗”, hold and drag the left mouse button.

You can also scale the object by moving the cursor onto the arrows on the sides of the selected object; when the cursor changes into “↔” or “↕”, hold and drag the left mouse button. (Fig. 5-13)

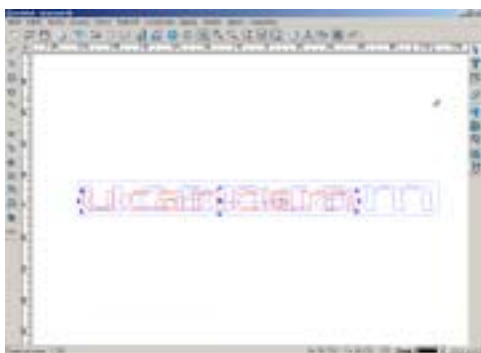
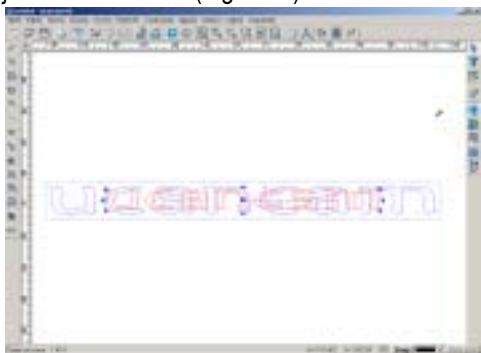


Fig. 5-13a (dragging the corner)



Fig. 5-13b (dragging the sides)

REMARK: Press and hold the **Shift** key, and drag one arrow on the highlighting box, then the object will be scaled. (Fig. 5-14)



ig. 5-14a

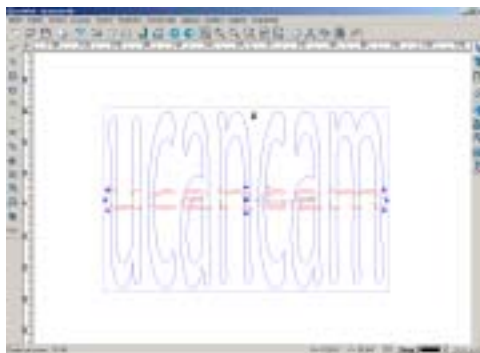



Fig. 5-14b

You can also scale a selected object accurately by typing values.

1. Click the icon  on Transform Bar, or click Transform->Scale.
2. The Scale dialog is displayed. (Fig. 5-15)

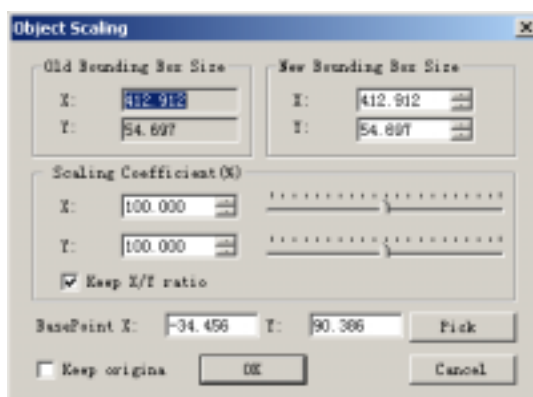


Fig. 5-15


Old Bounding Box Size: displays the width and height of the original object. (X is the width, and Y is the height.)

New Bounding Box Size: is for typing the new width and height value.

Scaling Coefficient: is to scale an object by changing X and Y percentum.

Keep X/Y ratio: If you enable Keep X/Y ratio, then the object will be scaled according to original width to height ratio, which means changing the X value will cause the value in Y direction to change. If you deselect “√”, then the change of the height and width of the object will not influence each other.

Keep Original: If you enable it, then the original graph will be kept in the drawing window after its scale is changed; if you deselect it by removing “√”, then the original graph will not be kept in the drawing window.

Click the icon  or the Enter key to validate the setup.

Note: Scaling function is not valid in Editing Input mode.

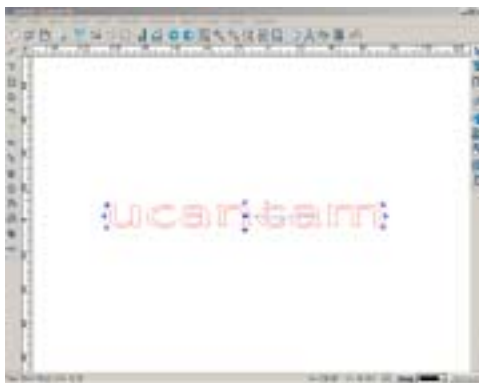


Fig. 5-16a (select the graph)



Fig. 5-16b (set the parameters)



Fig. 5-16c (the effect after setup)

As we can see from Fig. 5-16, the base point in scale transforming is the center of the rectangle, but you can change its location in **Base Point** box in Editing Input mode after clicking **Text->Text Tools**.

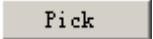
You can input the coordinate value in X and Y, or you can also click the icon  and select a coordinate point by clicking in the drawing window.



Fig. 5-17

REMARK: The base point is the center of the object and the object is scaled with this point as the center. That is to say the base point is the only point whose position is not changed during scaling. Baseline is the central line of the object. The object is scaled with this line as the center line. In other words, the base line is the only line whose position is not changed during scaling.

5.2.3 Locate


You can move a shape to a specific position by entering X and Y coordinates of the center point of the shape.

Click **Transform->Locate** on the menu bar, and a dialog is displayed. Then enter the values in the dialog, and then the position of the shape is fixed.

5.2.4 Object Rotation

There are several ways to rotate a selected object.

The commonly used method is shown below.

1. Select an object
2. Move the cursor into the highlighting box.
3. When the cursor changes into “”, hold and move the left mouse button to rotate the object.

You can also rotate an object by pressing the Ctrl key and the left/right keyboard arrow key. The object will be rotated anticlockwise by holding the left keyboard arrow key, and it will be rotated clockwise by holding the right keyboard arrow key.

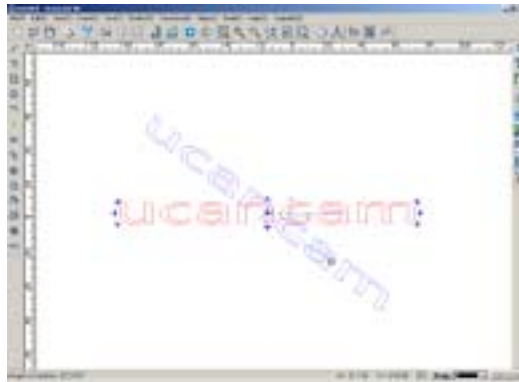


Fig. 5-18

REMARK: The original object will be preserved in the drawing window if you press the **Shift** key while rotating the object. (Fig. 5-19)

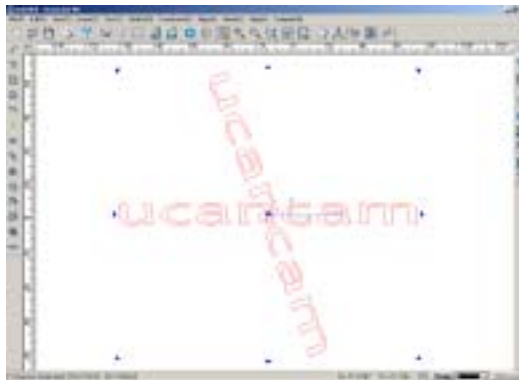

Fig. 5-19a (hold the **Shift** key)

Fig. 5-19b (the original object is preserved in the drawing window)

To rotate an object accurately, there are two ways: mouse rotate and angle rotate.

- **Mouse Rotate**

1. Click the icon  in Transform Bar, or click Transform -> Rotate->Mouse Rotate.

2. The words **Start of rotation line** are displayed in the status bar.
3. Input the coordinate, e.g. (10,10), and press Enter key.
4. Then the words **End of rotation line** is shown in the status bar.
5. Input the coordinate and press Enter, and the object is rotated.

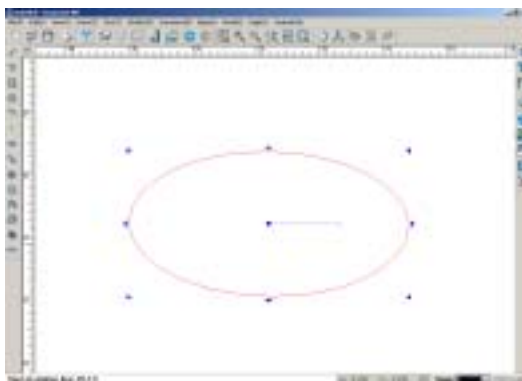


Fig. 5-20a (input the start rotation line)

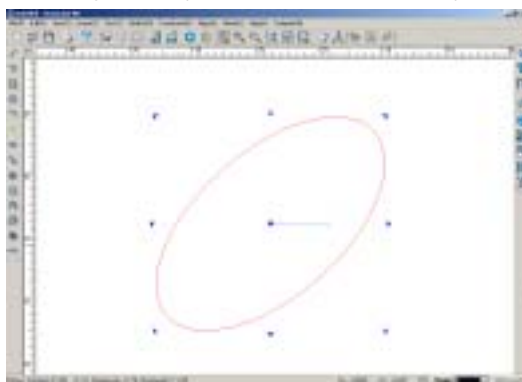


Fig. 5-20b (after inputting the end rotation line)

REMARK: The angle formed by the X-axis (the horizontal direction) and the rotation line is the rotation angle, and the starting point of the rotation line is the rotation center of the object.

● **Angle rotate**

1. Select Transform->Rotate->Angle rotate.
2. The words **Angle of rotation line** are shown in the status bar.
3. Type the value, e.g. 45, and press the Enter key. (Fig. 5-21)

Remark: After selecting the object, each press at the space key will cause the object to rotate by 90 degrees anticlockwise.

Status
Bar

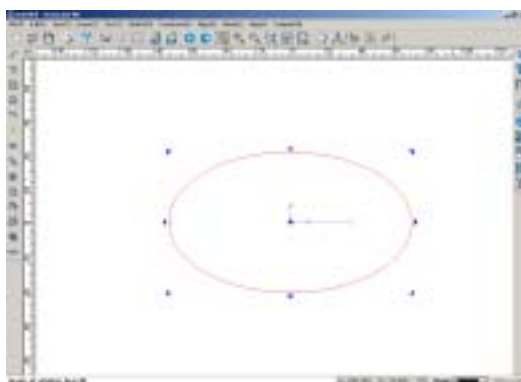


Fig. 5-21a (input the angle value 45 in the status bar)

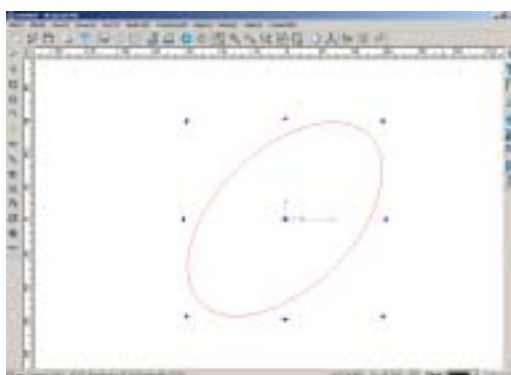


Fig. 5-21b (after rotation)

You can rotate an object by specific angles by using the mouse and the keyboard simultaneously.

1. Move the cursor onto the arrows of the highlighting box.
2. When the cursor changes into “↖” or “↗”, hold and drag the left mouse button to move towards the opposite corner.
3. The object is rotated by 180 degrees with the opposite corner as the rotation center. (Fig. 5-22)

If you drag the left mouse button when the cursor changes into ↖ or ↗ and hold the Shift key at the same time, the object will be rotated by 180 degrees with its center as the rotation center. (See Fig. 5-23)



Fig. 5-22




Fig. 5-23

5.2.4 Mirror

There are three ways to mirror an object: horizontal mirror, vertical mirror and line mirror.

- **Horizontal mirror**

Horizontal mirror is to mirror the object with its horizontal center line as the axis.

1. Select an object.
2. Click the icon  on Transform Bar, or click Transform-> Horizontal mirror.

- **Vertical mirror**

Vertical mirror is to mirror the object with its vertical center line as the axis.

1. Select an object.
2. Click the icon  on the Transform Bar, or click Transform-> Vertical mirror.



Fig. 5-24a (original)



Fig. 5-24b (after horizontal mirroring)

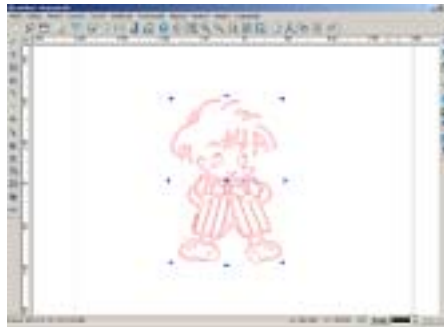


Fig. 5-24c (after vertical mirroring)

- **Line Mirror**

Line mirror is also provided by Ucamcam V8.


1. Click the icon  in Transform Bar, or click Transform-> Line mirror.
2. The words **Start of mirror line** are shown in the status bar.
3. Type a coordinate value, e.g. 25,25, and press Enter key.
4. The words **End of mirror line** are shown in the status bar.
5. Type a coordinate value, e.g. 100,100, and press the Enter key.
6. The words **Keep original object** are shown in the status bar. Input "Y" to preserve the original object in the drawing window or "N" to remove the original object from the drawing window, and validate the command by pressing the Enter key.



Fig. 5-25a (click Line mirror, and input the value of start of mirror line)





Fig. 5-25b (Type the value of end of the mirror line)





Fig. 5-25c (the result)

You can mirror the object by using the mouse and the keyboard together.

1. Put the cursor onto the four arrows on the highlighting box.
2. When the cursor changes into  or , hold the left mouse button and drag it to minify the object. (Fig. 5-26)

You can also mirror an object by following the steps below.

1. Press and hold the **Shift** key when the cursor changes into  or .
2. Drag the left mouse button to minify the object. (Fig. 5-27)

Remark: The object is scaled when this type of mirroring is done.





Fig. 5-26



Fig. 5-27

5.2.5 Shear

To shear an object

1. Select an object.
2. Hold the Ctrl key and at the same time move the cursor onto the arrows of the highlighting box.
3. When the cursor changes into  or , hold the left mouse button and drag it.

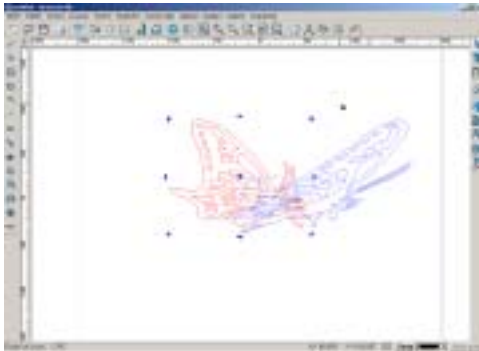


Fig. 5-28a (drag the mouse to shear the object)

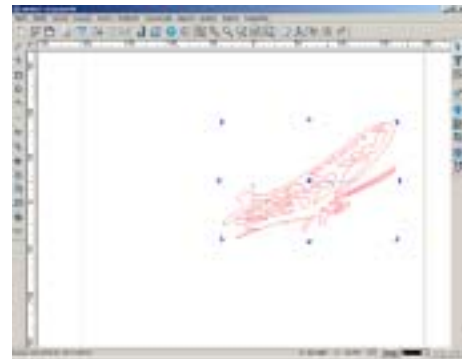


Fig. 5-28b (after shearing)

You can also shear an object accurately by using shear command.

Click the icon  on Transform Bar, or click Transform->Shear to display a dialog. (Fig. 5-29)

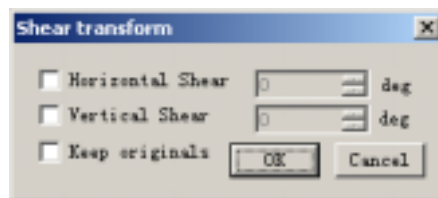


Fig. 5-29

Horizontal shear: is used to set horizontal shear level.

Vertical shear: is used to set the vertical shear level.

Keep originals: is used to preserve the original object in the drawing window after it is sheared.

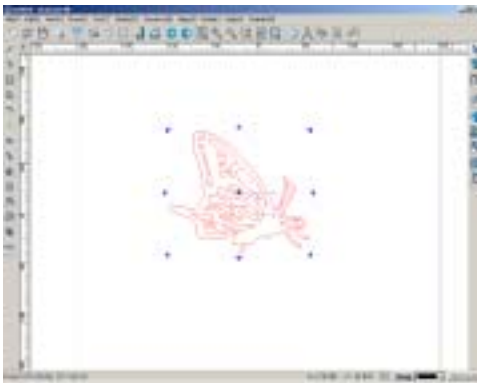


Fig. 5-30a (the original graph)

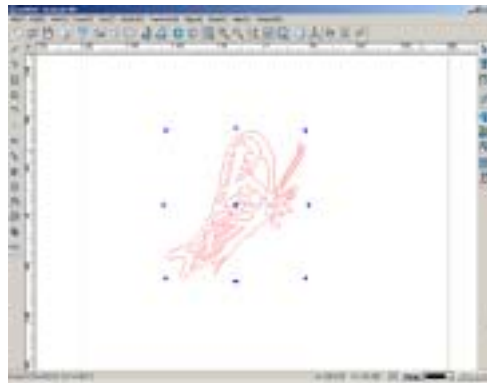


Fig. 5-30b (the effect after the object is inclined)

5.2.6 Arc Fit

You can change a Bezier curve, which is composed of small broken lines, into a curve, which is composed of arcs. In this way, machining efficiency is greatly improved, because arcs take much less time to calculate during tool path output than Bezier.

To apply arc fit to an object

1. Select an object.
2. Click Transform->Arc Fit in the menu bar.
3. A dialog is displayed.
4. Set the parameters, and click on OK to validate the setup.

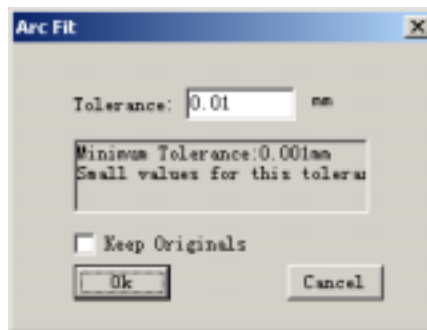


Fig. 5-31

Parameters include:

Tolerance: is the precision of arc fit.

Keep Originals: is to preserve the original object in the drawing window if you tick it.

Remark: Arc Fit function is valid only to drawings which are composed of lines. It is not valid to images.


5.3 Align

You can align several objects by using **Align** function.

5.3.1 To Align An Object

There are five ways to align an object: align on left, align on right, align to top, align to bottom and align on center.

Align on left: is to align several selected objects along the left side of the first selected object. There are three ways to enable this function:

- Click the shortcut icon  on **Aligning Bar**.
- Click **Align->Align on left** in the menu bar.
- Press **Ctrl + Num4**.

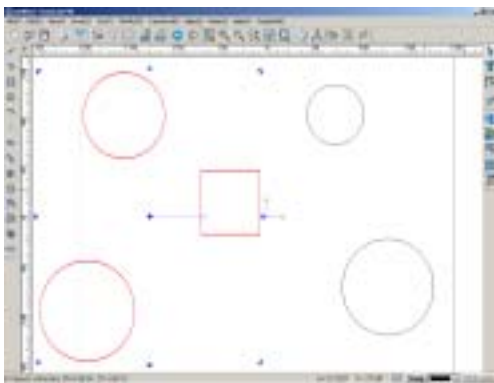


Fig.5-32a (original)

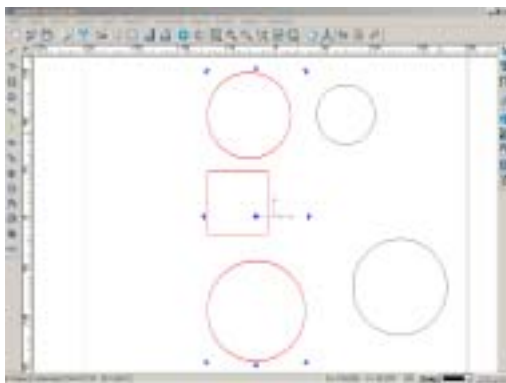



Fig. 5-32b (align on left)

Align on right: is to align several selected objects along the right side of the first selected object. There are three ways to enable this function.

- Click the shortcut icon  on **Aligning Bar**.
- Click **Align->Align on right** in the menu bar.
- Press **Ctrl+Num6**.

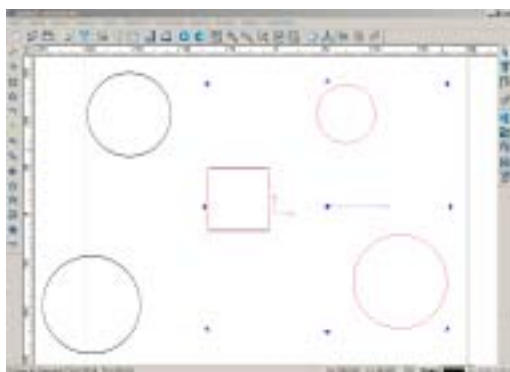


Fig. 5-33a (original)

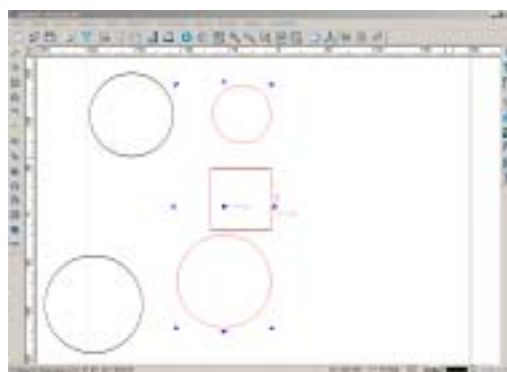


Fig. 5-33 b (align on right)

Align to top: is to align several selected objects along the top line of the first selected object. There are three ways to enable this function.

- Click the shortcut icon  on **Aligning Bar**.
- Click **Align->Align to top** in the menu bar.
- Press **Ctrl+Num8**.

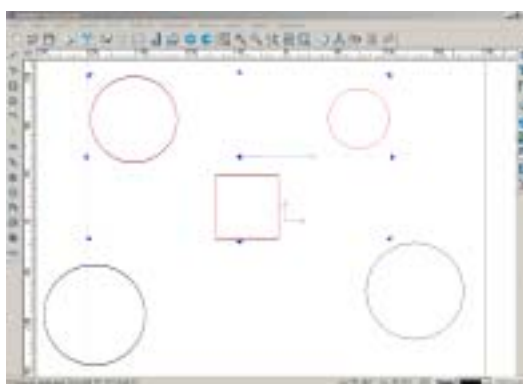


Fig. 5-34a (select the objects)

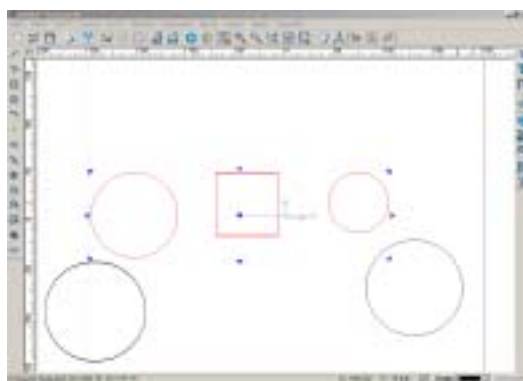



Fig. 5-34b (the effect after the object is aligned top)

Align to bottom: is to align several selected objects with the bottom line of the first selected object. There are three ways to enable this function.

- Click the shortcut icon  on **Aligning Bar**.
- Click **Align->Align to bottom** in the menu bar.
- Press **Ctrl+Num2**.

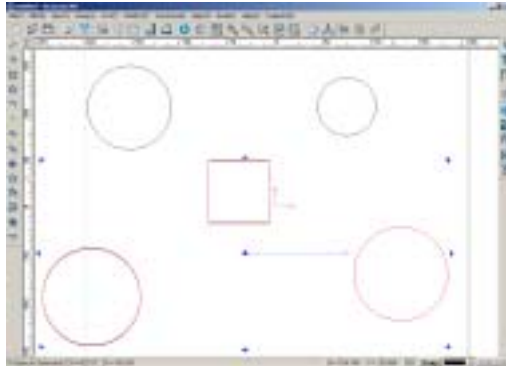


Fig. 5-35a (select the objects)

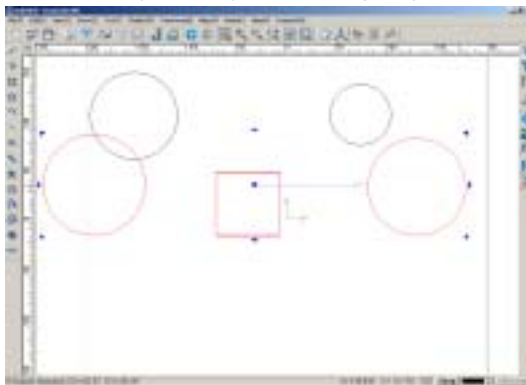



Fig. 5-35b (the effect after the objects are aligned bottom)

Align on center: is to make the center of several selected objects the same as that of the first selected object. There are three ways to enable this function.

- Click the shortcut icon  on **Aligning Bar**.
- Click **Align->Align on center** in the menu bar.
- Press **Ctrl+Num5**.

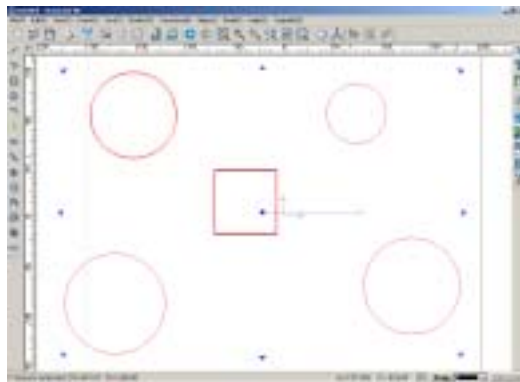


Fig. 5-36a (select the objects)

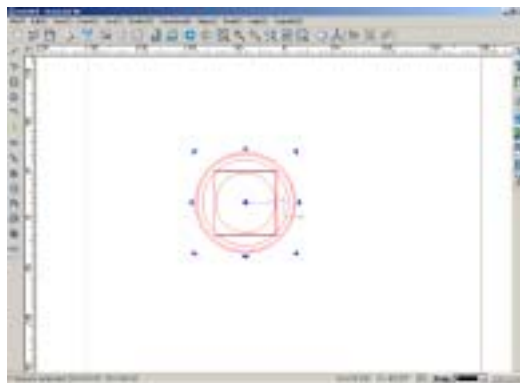


Fig. 5-36b (the effect after the object is aligned center)

5.3.2 Vertical aligning & Horizontal aligning

Vertical Aligning: is to align the vertical central line of several selected objects along that of the first selected object.

There are three ways to enable this function.

- Click the shortcut icon  on **Aligning Bar**.
- Click **Align->Vertical aligning** in the menu bar.
- Press **Alt +V**

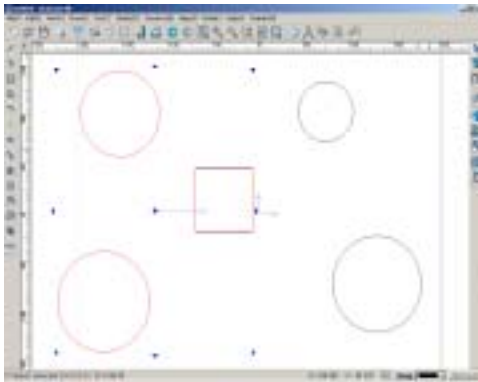


Fig. 5-37a (select the objects)

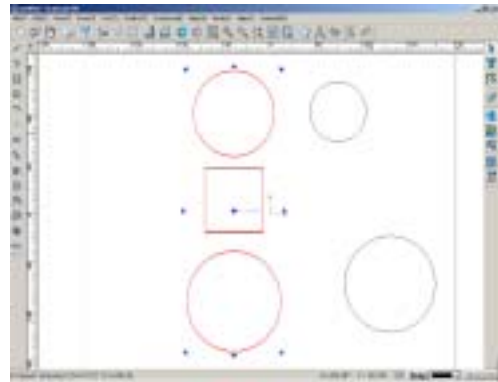



Fig. 5-37b (after Vertical aligning)

Horizontal Aligning: is to align several selected object along the horizontal central line of the first selected object. There are three ways to enable this function.

- Click the shortcut icon  on **Aligning Bar**.
- Click **Align->Horizontal aligning** in the menu bar.
- Press **Alt +H**.

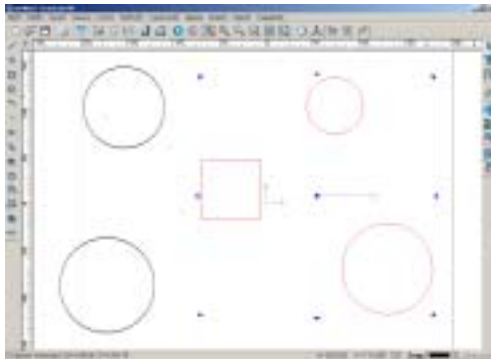


Fig. 5-38a (select the objects)

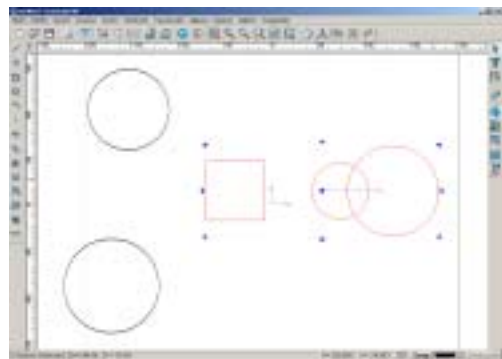



Fig. 5-38b (after horizontal aligning)

5.3.3 Space

There are two types of space: **horizontal spacing** and **vertical spacing**.

Horizontal spacing: is to position the selected objects with the same space between each other horizontally.

There are three ways.

- Click the shortcut icon  on **Aligning Bar**.
- Click **Align->Horizontal spacing** in the menu bar.
- Press **Alt + [**.

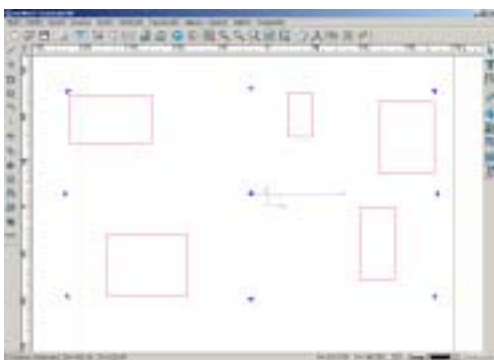


Fig. 5-39a (select the objects)

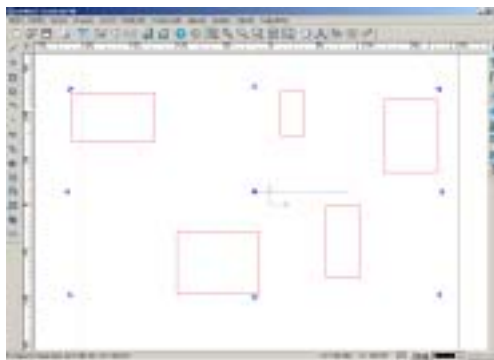



Fig. 5-39b (after horizontal spacing)

Vertical spacing: is to position several selected objects with the same space between each other vertically. There are three ways.

- Click the shortcut icon  on **Aligning Bar**.
- Click **Align->Vertical spacing** in the menu bar.
- Press **Alt +]**.

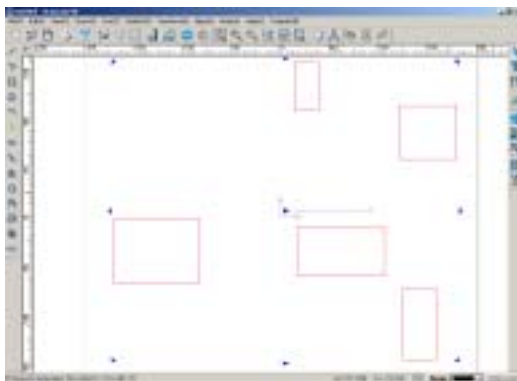


Fig. 5-40a (select the objects)

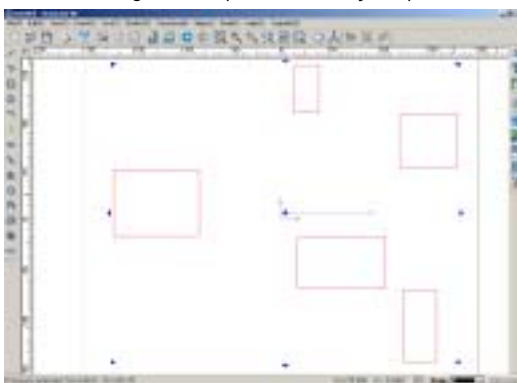



Fig. 5-40b (after vertical spacing)

REMARK: The number of the selected objects must be over two.

5.3.4 Make Same Size

To make the size of several selected objects the same, you can click Transform->Scale, but this method requires too much work and time. You can make it easier by using **Align ->Make same size** command on the menu bar. There are three ways to enable this function.

- Click the shortcut icon  on **Aligning Bar**.
- Click **Align->Make same size** on the menu bar.
- Press **Ctrl+Alt+A**.

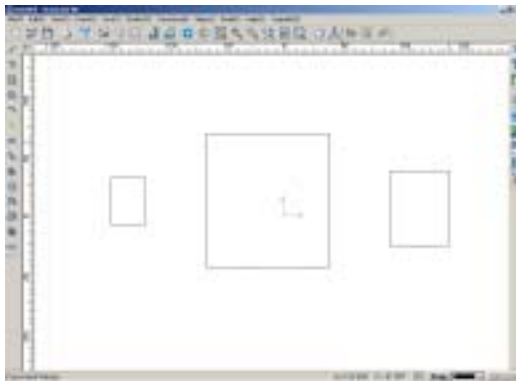


Fig. 5-41a (select the objects)

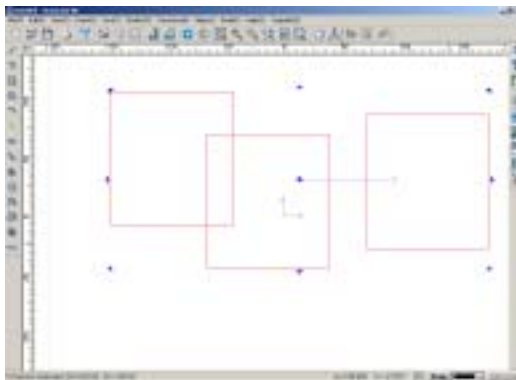



Fig. 5-41b (the effect)

There are two additional functions in Ucam V8: **Make same width** and **Make same height**.

Make same width: is to make the width of the selected object the same as that of the first selected object. There are three ways to start this function.

- Click the shortcut icon  in **Aligning Bar**.
- Click **Align->Make same width** in the menu bar.
- Press **Ctrl+ Alt+ W**.

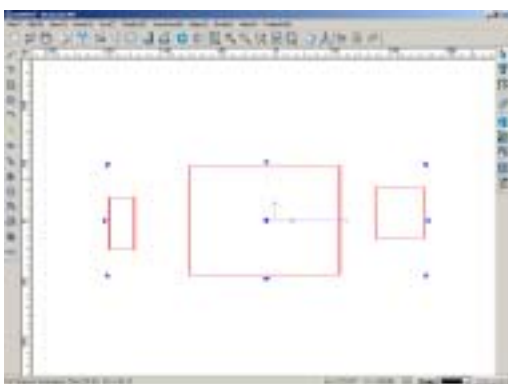


Fig. 5-42a (select the objects)

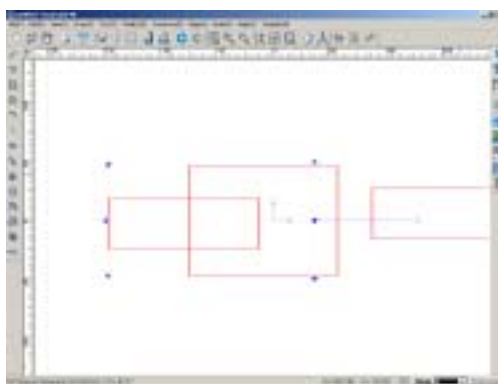



Fig. 5-42b (the effect)

Make same height: is to make the height of the selected objects the same as that of the first selected object.

There are three ways to enable this function.

- Click the shortcut icon  in **Aligning Bar**.
- Click **Align->Make same height** in the menu bar.
- Press **Ctrl+ Alt+ H**.

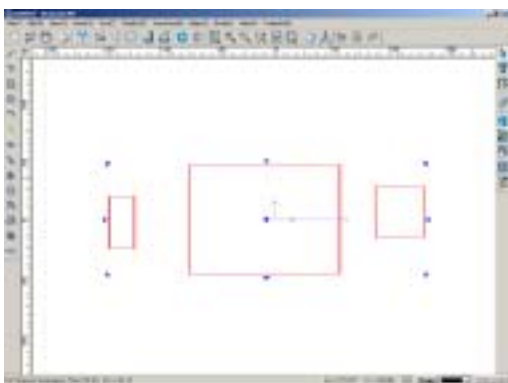


Fig. 5-43a (select the object)

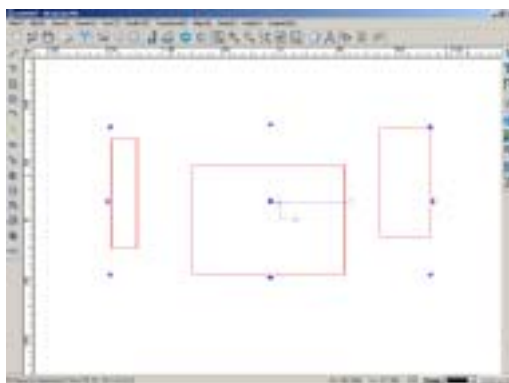



Fig. 5-43b (the effect)

5.4 Perspective Distortion

1. Select the graph.
2. Click on the icon  on **Transform Bar** or click **Transform->Perspective Distortion**.
3. A net is displayed.

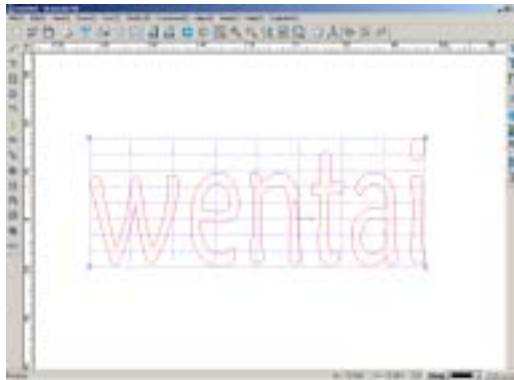


Fig. 5-44

Hold and drag the four panes in the corners of the net, and the object is distorted. (Fig. 5-48)

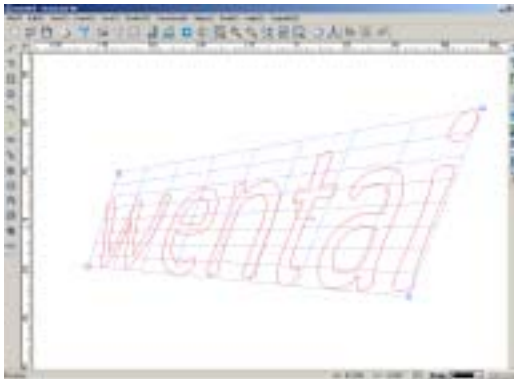



Fig. 5-45

Press the right mouse button or the Esc key to exit the operation.

5.5 Envelop Distortion

This is used to change the form of the selected object.

1. Select an object
2. Click the icon  on the Transform Bar or click Transform->Envelop distortion.
3. A box with several nodes and a dialog are shown. (Fig. 5-46)

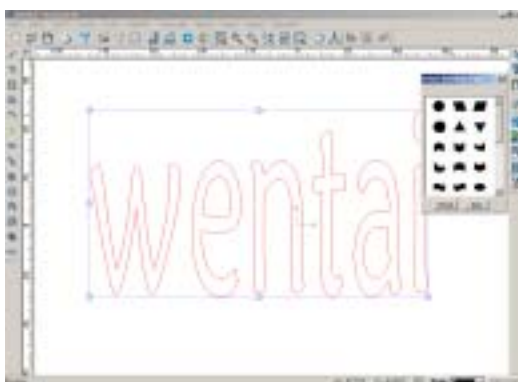


Fig. 5-46

Select a shape from the dialog Select Envelop Type (on the right of the drawing window). (Fig. 5-47)



Fig. 5-47

REMARK: The object resumes the original shape by clicking **Reset**; to save the new shape, click **Quit**.

Then you can change the shape of the object by dragging the nodes on the selected frame.

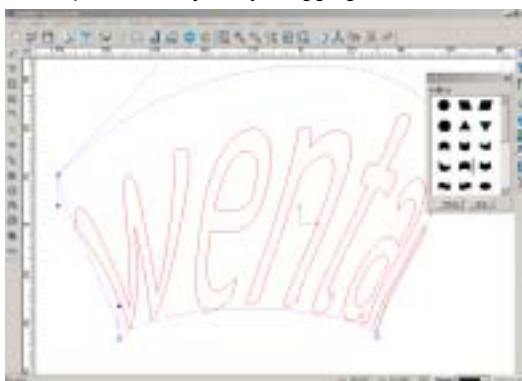


Fig. 5-48

Double click on a node of the frame to delete it; click on a point of the box to add a node.

When selecting several nodes at a time, the selected nodes will be filled with the color blue, and then you can move the selected nodes together by mouse. (Fig. 5-49)

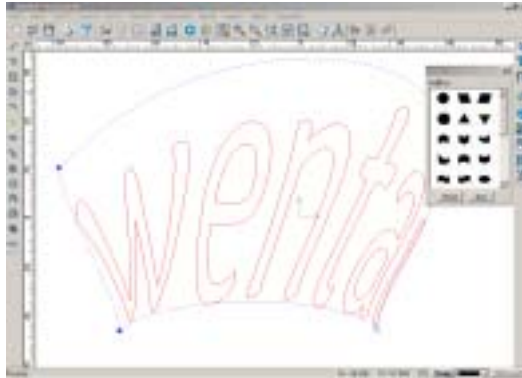


Fig. 5-49a (select several nodes)

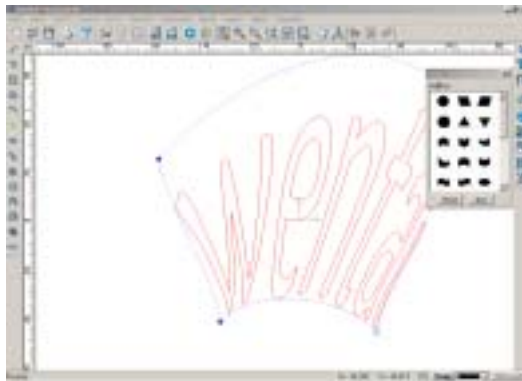


Fig. 5-49b (the effect)

5.6 Push and Pull Distortion

Push and Pull Distortion is to distort an object by pulling or pushing its base point.


1. Select an object.
2. Click on the icon  on Transform Bar or click Transform->Push and Pull Distortion.
3. Select the base point by clicking in the drawing window. (Fig. 5-50)



Fig. 5-50

4. Move the cursor onto the base point
5. When the cursor changes into +, hold and drag the left mouse button to distort the object.
(Fig. 5-51)

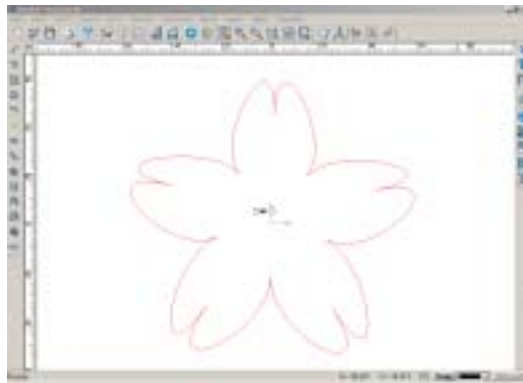


Fig. 5-51

Click the right mouse button or the Esc key on the keyboard to exit the operation.

5.7 Twist Distortion

This is to distort an object by rotating its base point.

1. Select an object.
2. Click on shortcut icon  on Transform Bar or click Transform->Twist Distortion.

The base point is shown. (Fig. 5-52)

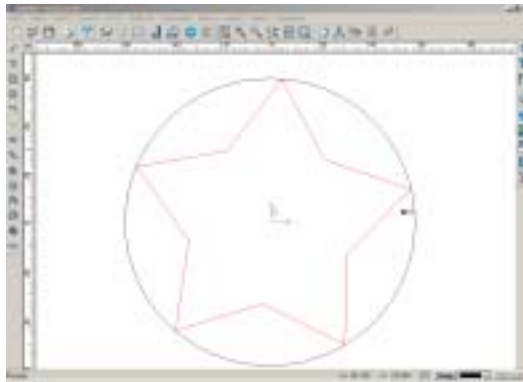


Fig. 5-52

3. Move the cursor onto the base point.
4. When the cursor changes into +, hold and drag the left mouse button to change the object into desired shape. (Fig. 5-53)

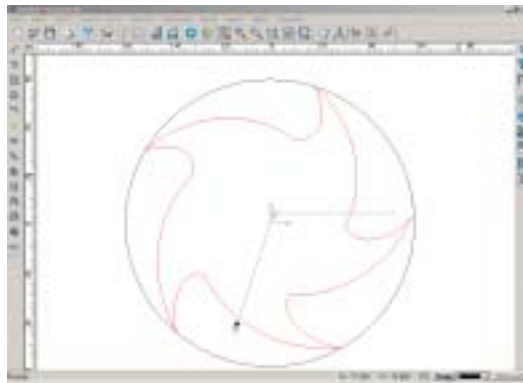


Fig. 5-53

Press the right mouse button or the Esc key to exit the operation.

5.8 Auto Nesting

Several objects with various shapes and sizes can be arranged in a selected shape to save material.

The following is an example.

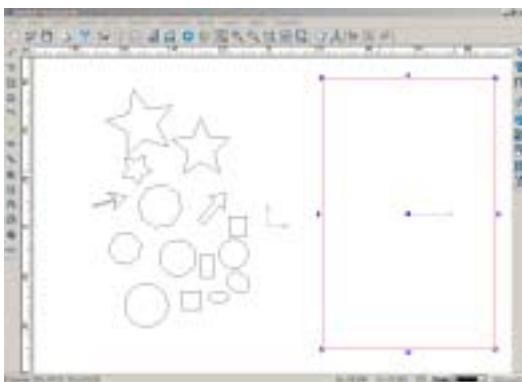




Fig. 5-54

1. Select all the objects.
2. Click on the icon  on Transform Bar or select Transform->Auto Nesting
3. The cursor changes into .
4. Move the cursor onto the side of the rectangular box.
5. When the box turns light blue, click the left mouse button.
Then the dialog **Auto Nesting** is shown. (Fig. 5-55)

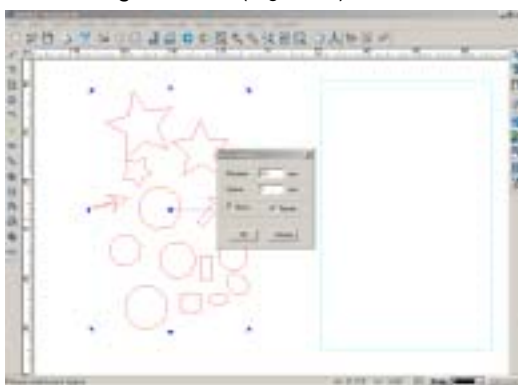


Fig. 5-55

Precision: is the precision of auto nesting.

Space: is the space between each two objects. (Do not set the value too small; otherwise the material can not be machined properly.)

Mirror: Some objects will be automatically mirrored to save the material during auto nesting.

Rotate: Some objects will be automatically rotated to save material.

After setting the parameters, click on **OK** to validate it.

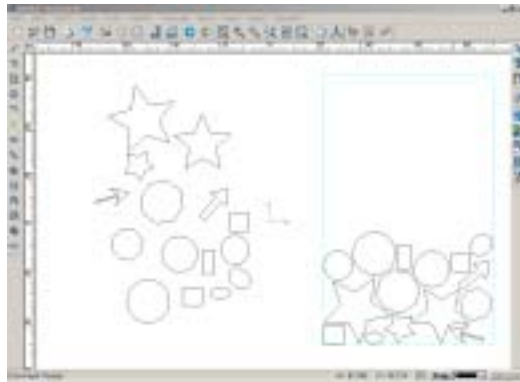


Fig. 5-56

5.9 Interactive Nesting

You can manually nest objects by **Interactive Nesting**.

1. Click **Transform->Interactive Nesting** in the menu bar. A dialog box is displayed on the left of the screen.
2. Enter values in the box, and click on **Step Setting**.
3. Click on the border of the **shape** into which you are to nest the objects, and the shape becomes red lined.
4. And click on **Confirm** in **Stock** box.
5. Then click on the border of the object to be nested, and the object becomes red.
6. Click on **Confirm** in **Part** box, and the object is surrounded by a blue border.
7. Move the cursor into the object, and move it into the **shape**.

Then you can repeat steps 5-7 to nest other objects.

Remark: When two objects are too near to each other for machining, you will hear a warning from your computer.

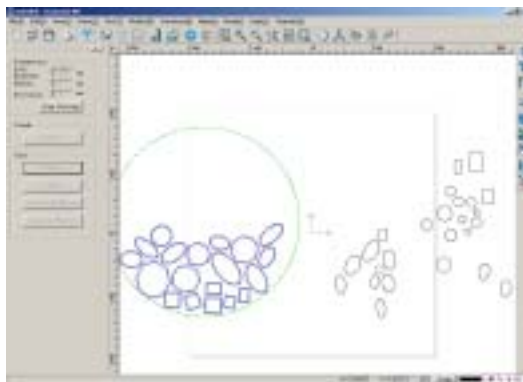



Fig. 5-57

5.10 Cancel & Repeat

5.10.1 Cancel

Ucancam V8 lets you cancel actions through any one of the following three methods.

- Click on the shortcut icon  in Standard Bar.
- Click Edit->Cancel in the menu bar.
- Press the shortcut key Ctrl + Z.

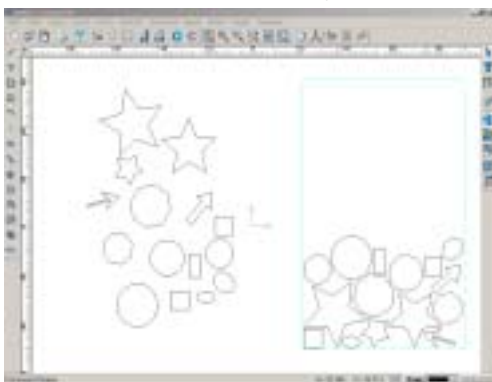


Fig. 5-58a

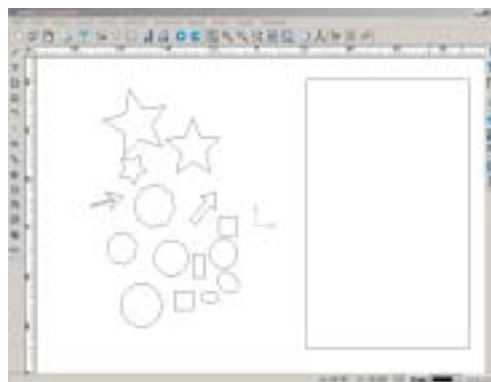



Fig. 5-58b

5.10.2 Repeat

There are three ways to repeat an action.

- Click on the shortcut icon  in Standard Bar.
- Click Edit-Repeat in the menu bar.
- Press Ctrl + Y.

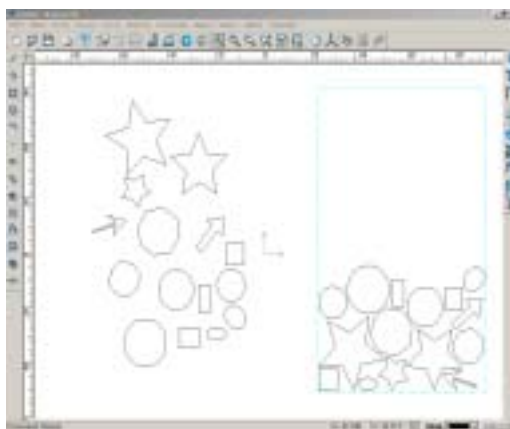


Fig. 5-59

CHAPTER SIX GRAPH EDITING

Editing operations include: copy, paste, cut, delete, trim, divide, offset, expand, join, common, not common, subtract, group, ungroup, and duplication.

6.1 Copy, Paste, Cut

To copy an object

1. Select an object.
2. Select Edit->Copy or press Ctrl + C.
3. Select Edit->Paste or press Ctrl + V.
4. The words **Please input base point** are shown in the status bar. (Base point is the center of the object.)
5. Type a value (e.g. 10, 10) or just click in the drawing window to define the position of the base point.

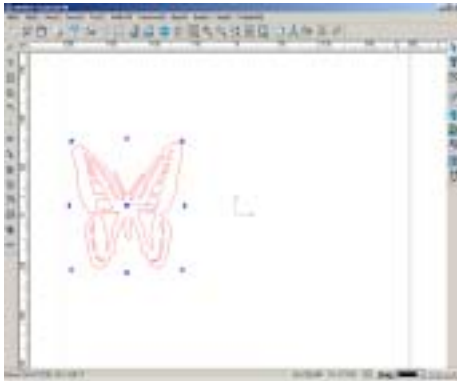


Fig. 6-1a (copy the selected object)

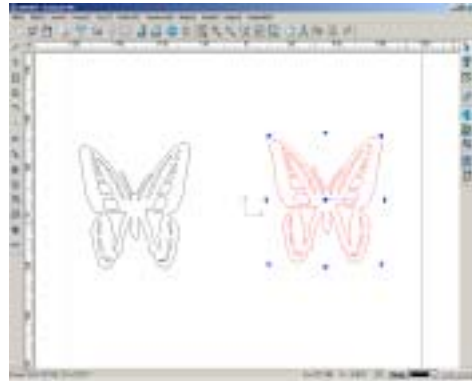


Fig. 6-1b (paste)

6.2 Delete

To delete an object

1. Select an object.
2. Click Edit->Delete or press Delete key in the keyboard.



Fig. 6-2a (before deletion)

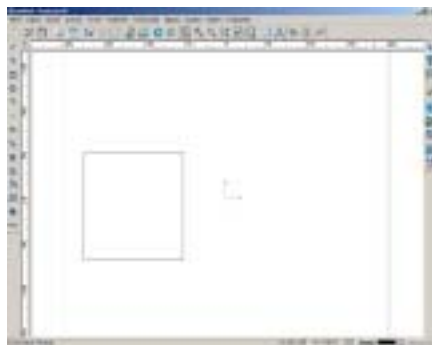



Fig. 6-2b (after deletion)

6.3 Trim

To trim an object

1. Select an object.
2. Click on the icon  or click **Modify->Trim**.
3. The cursor then changes into scissors. Move the scissors onto the object, and the part pointed by the scissors will turn light blue.
4. Click the left mouse button, and that part of the object will be trimmed off. Click the right mouse button or press the Esc key to end the operation.

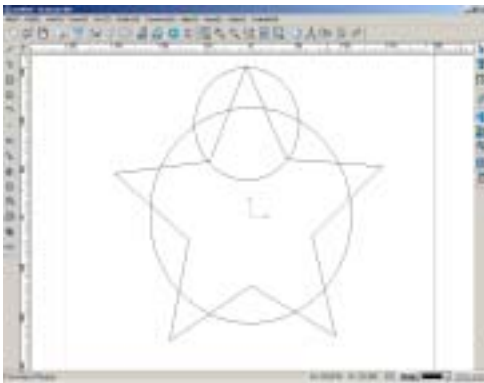


Fig. 6-3a (original graph)

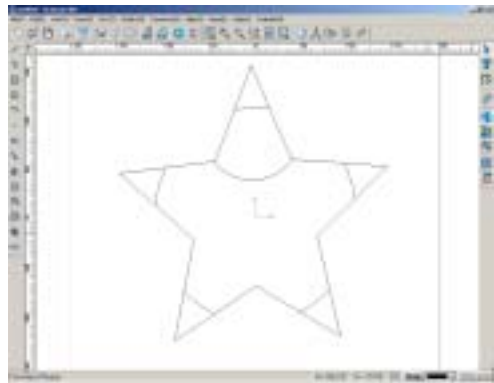


Fig. 6-3b (after being trimmed)

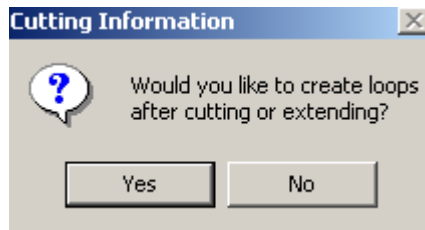



Fig. 6-4

REMARK: If you press the Ctrl key while trimming, then the selected part where  appears will be separated from the original object.

The other function of **Trim** is to extend a line to intersect with another object such as a line or a curve/arc/combine curve/spiral. If there is no curve or line to intersect with it in the direction of the dragged line, then the line cannot be extended.

To extend a line

1. Select the line to be extended.
2. Click on the icon  or click **Modify->Trim**.
3. Place the cursor in the blank area between the line and the other object which is going to

intersect with it.

4. When a dotted line appears between the line and the object, click the left mouse button.
5. The line is extended and intersects with the object (In the example below, the object is also a line.).

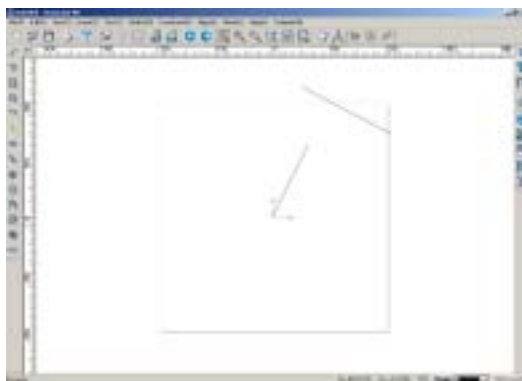


Fig. 6-5a (original)

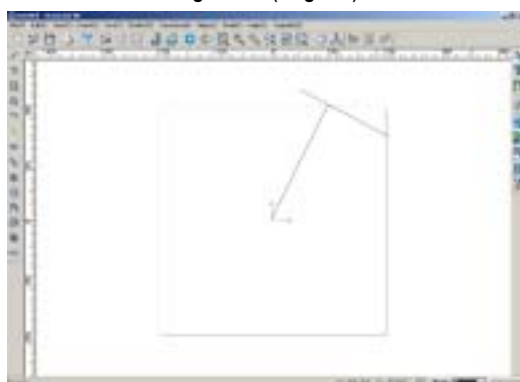


Fig. 6-5b (after being extended)

REMARK: The number of objects to be trimmed must be two or above, and in the case of trimming a compound graph, the graph must be ungrouped first.

6.4 Offset

Offset means to extend the object inward or outward by the same distance.

1. Select an object.
2. Click on the icon  on **Modification Bar** or select **Modify->Offset**.

Then the following dialog is displayed. (Fig. 6-6)

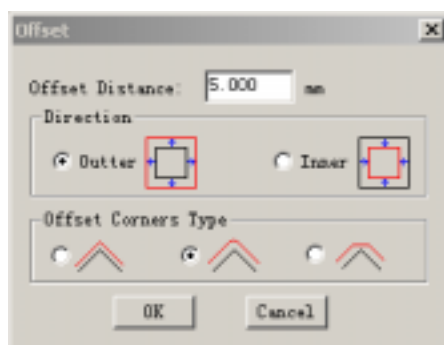


Fig. 6-6

There are two ways to offset an object: inner and outer.

Offset corners type includes: rounded, sharpened, chamfered.

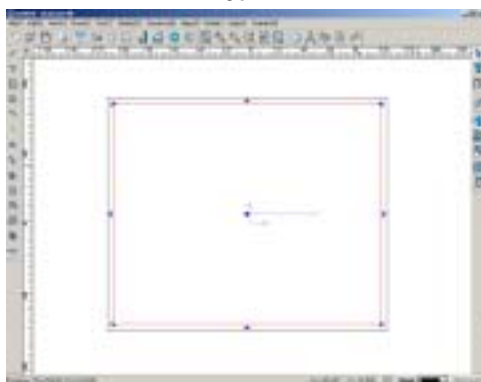


Fig. 6-7a (sharpened)

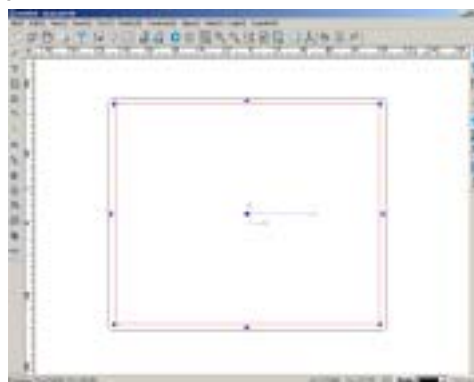


Fig. 6-7b (rounded)

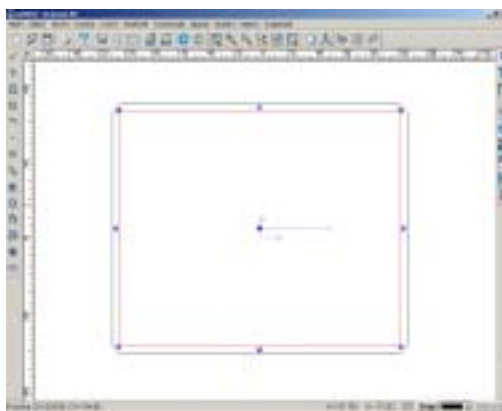


Fig. 6-7c (chamfered)

In Fig. 6-8, there is a curve; we now apply outer offset to it with a distance of 10mm. Then the effect is shown in Fig. 6-9.



Fig. 6-8

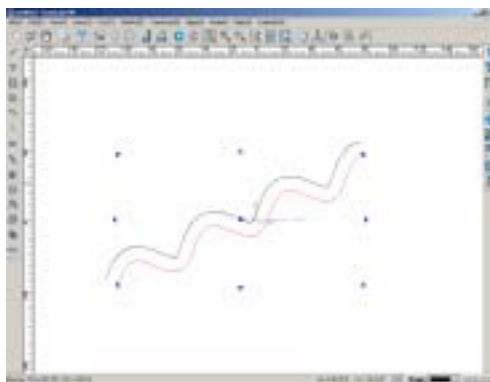



Fig. 6-9

6.5 Expand

Expand is to offset an object both inward and outward at the same time.

To expand an object

1. Select an object.
2. Click on the icon  on the **Modification Bar** or click **Modify->Expand**.
3. Input the distance in the status bar, and press Enter.

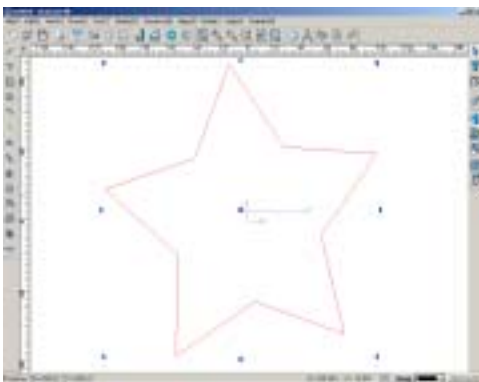


Fig. 6-10a (select the object)

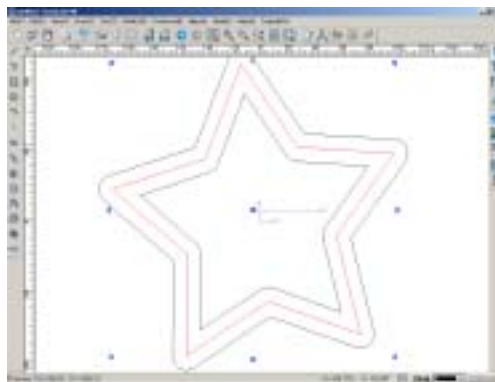


Fig. 6-10b (after being extended)

6.6 Close

Close is to link several curves (two or above) with lines.

Take the following as an example.

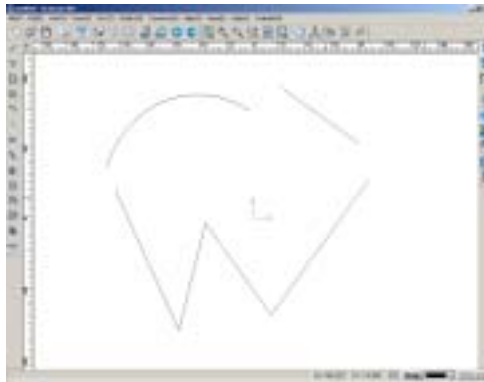



Fig. 6-11

1. Select all the objects
2. Click on the icon  in Modification Bar or click Modify->Close. Then the following dialog is displayed. (Fig. 6-12

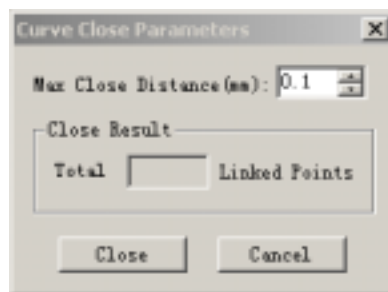


Fig. 6-12

3. Type a value in Max Close Distance.
Note: If the distance between two end points exceeds Max Close Distance, then the two points will not be linked.
4. Click on Close in the dialog.

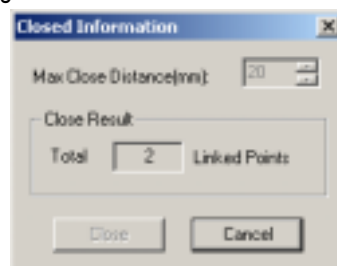


Fig. 6-13a

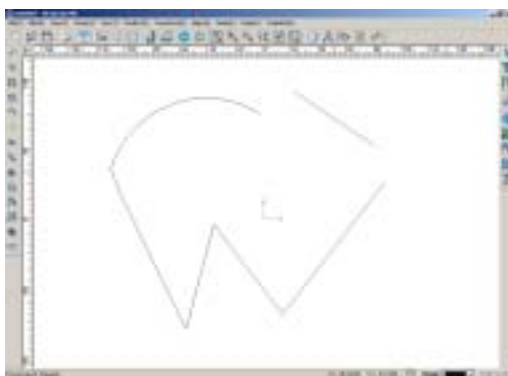


Fig. 6-13b (Two points are linked.)

Take another example. If we set the value of max close distance at 100mm, and click on the button Close in the dialog, then the result is shown in Fig. 6-14b. (All the points are linked)

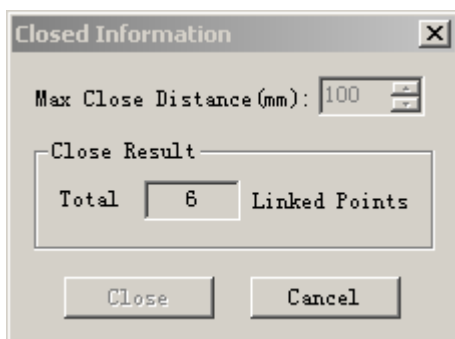




Fig. 6-14a



Fig. 6-14b

6.7 Direction

To change the direction of an object

1. Select an object whose direction is to be changed.
2. Click on the icon  on **Modification Bar** or click **Modify->Direction**.
3. The cursor changes into "". Put the cursor on the object.
4. The object will turn into dotted lines and its direction is shown. (Fig. 6-15).
5. Click the left mouse button on the object to display the **Flipping of Curve** dialog. (Fig. 6-16)
6. Click on **Yes** to reverse its direction, and click on **No** to remain its direction unchanged. (Fig. 6-17)

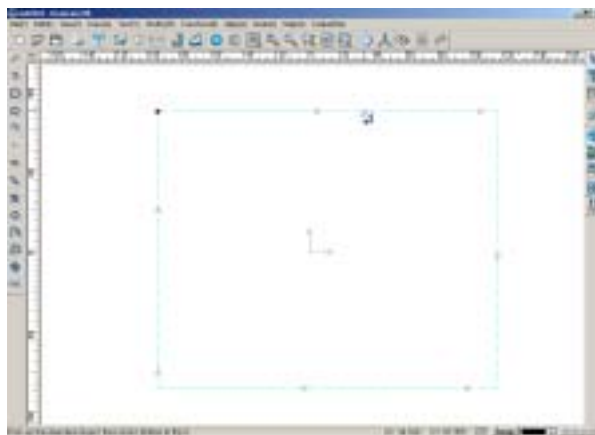


Fig. 6-15

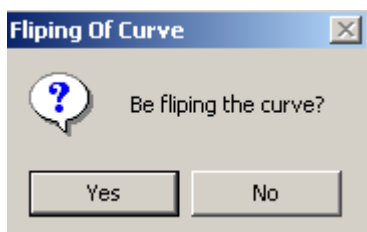


Fig. 6-16

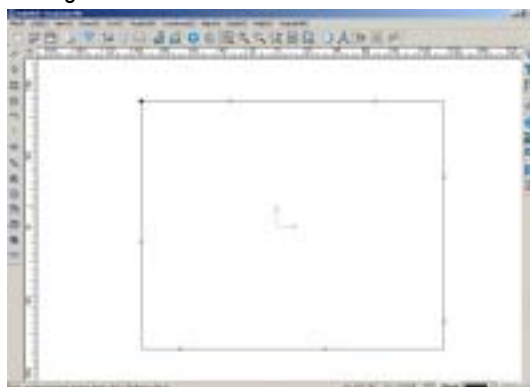


Fig. 6-17

Click the right mouse button in the drawing window or the Esc key in the keyboard, and then the displayed direction will be hidden.

6.8 Delete overlay loop

This function is to delete the overlaid parts of one graph or text in order to form tool path.

1. Select the object to be operated.
2. Select **Modify->Delete overlay loop**. (Fig. 6-18)

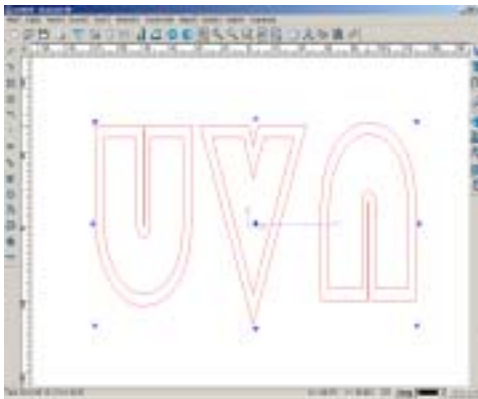


Fig. 6-18a (original)

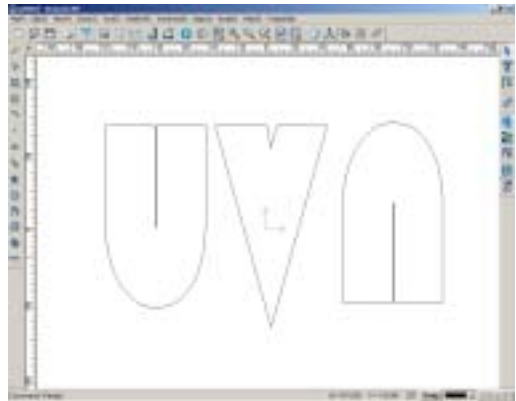


Fig. 6-18b (after deleting overlay loop)


6.9 Slice

Slice is to separate a graph into several smaller ones, and a close graph will remain close after this operation and the unclosed ones remain unclosed.

There are two types of Slice: **simple slice** and **complex slice**. **Simple slice** can be divided into **linear slice**, **rectangular slice** and **ellipse slice**; **complex slice** can be classified into **parallel slice**, **circular slice** and **radial slice**.

6.9.1 Simple Slice

Linear slice

1. Select an object.
2. Click on the icon  on Modification Bar or click **Modify->Simple slice->Linear slice**.
3. Draw a line on the selected object. (The line must traverse the object.)

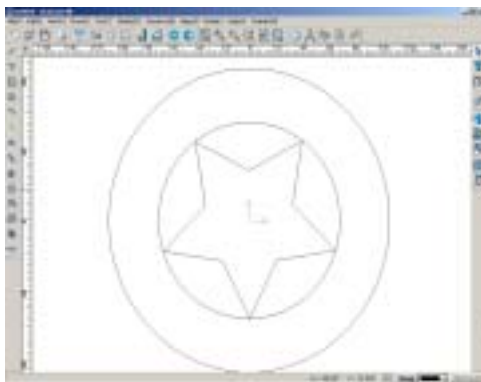


Fig. 6-19a (original)

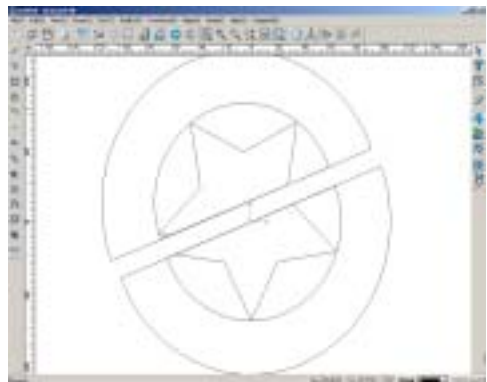



Fig. 6-19b (after being sliced)

Rectangular slice

1. Select an object.
 2. Click on the icon  on **Modification Bar** or click **Modify-Simple slice-Rectangular slice**.
 3. Draw a rectangle on the selected object, and the object is sliced.
- Note: The sides of the rectangle should intersect with the selected object.

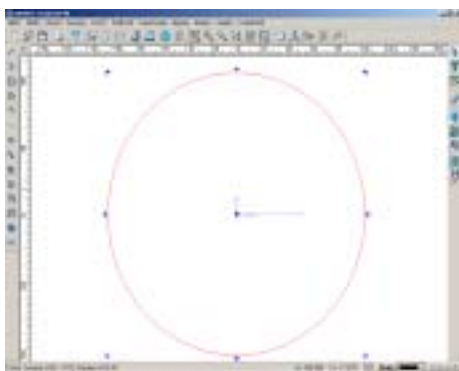


Fig. 6-20a (original)

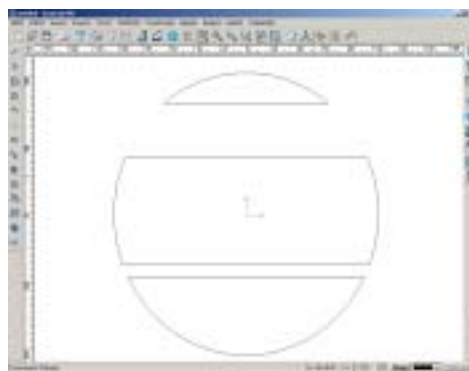



Fig. 6-20b (after being sliced)

Ellipse slice

1. Select an object.
 2. Click on the icon  on **Modification Bar** or click **Modify->Simple slice->Ellipse slice**.
 3. Draw an ellipse on the selected object and the object is sliced.
- Note: The border of the ellipse must intersect with the graph.

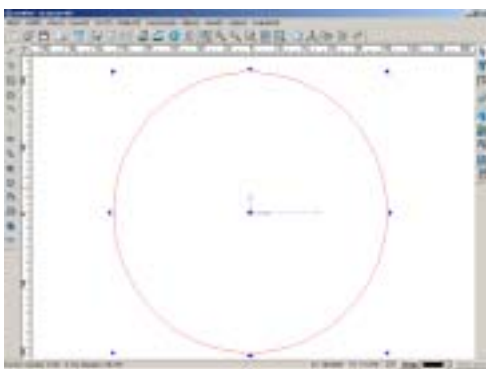


Fig. 6-21 (original)

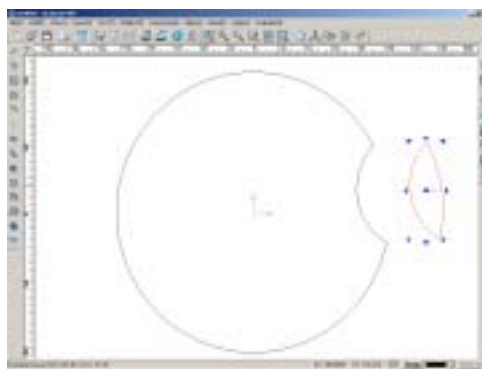



Fig. 6-22 (after being sliced)

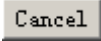
6.9.2 Complex Slice

Parallel slice

1. Select an object and click on the icon  on **Modification Bar** or click

Modify->Complex slice->Parallel slice.

2. Then a dialog is shown. The parameters include **line angle**, **preserve space**, and **remove space**. Line angle is formed by the slicing line and the horizontal line; preserve space is the width of the preserved parts; remove space is the space between each two preserved parts.

Click on the icon  in the dialog or press the Esc key and the right mouse button simultaneously.

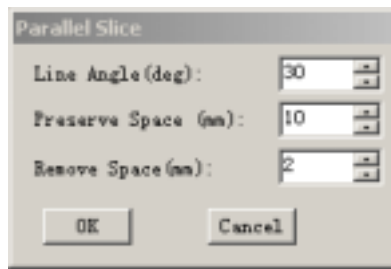


Fig. 6-23 (dialog)

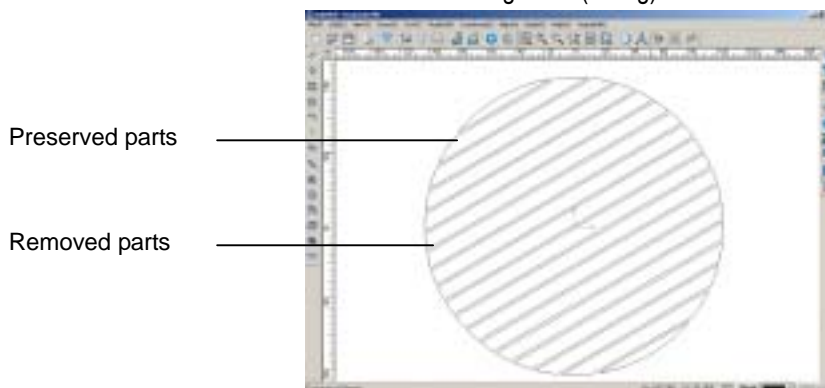



Fig. 6-24

Circular slice

1. Select an object.
2. Click on the icon  on the Modification Bar or click **Modify->Complex Slice->Circular slice**.

3. A dialog is displayed (Fig. 6-25).

The parameters include **start radius**, **preserve space** and **remove space**.

After setting the values, click **OK** to validate the operation and click **Cancel** in to quit the operation.

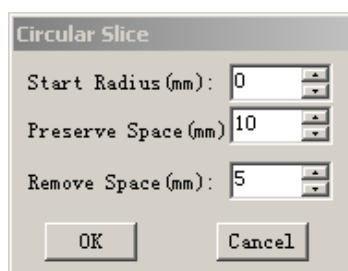


Fig. 6-25

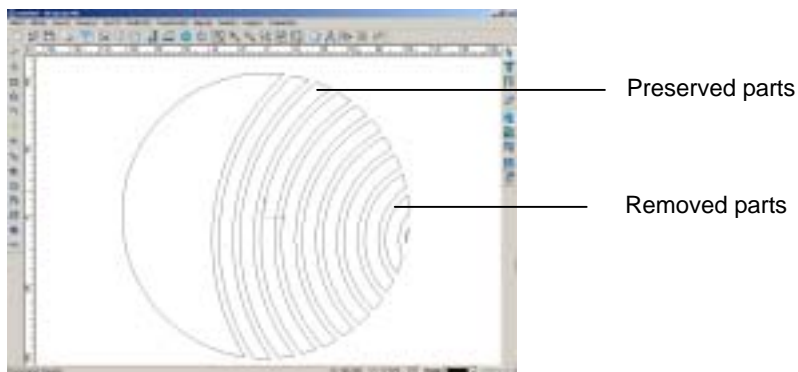



Fig. 6-26

Radial slice

1. Select the object to be sliced.
2. Click on the icon  on Modification Bar or click **Modify->Complex Slice->Radial Slice**.
3. A dialog is displayed. (Fig. 6-27)

The parameters include: start angle, keep angle and remove angle. Start angle is for setting the position of the radial area; keep angle is the angle of the preserved parts; remove angle is the angle between each two preserved parts.

After typing the values, click **OK** to validate the operation and click **Cancel** or press the right mouse button to exit the operation.

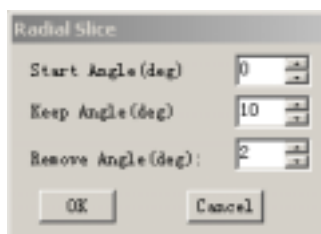


Fig. 6-27

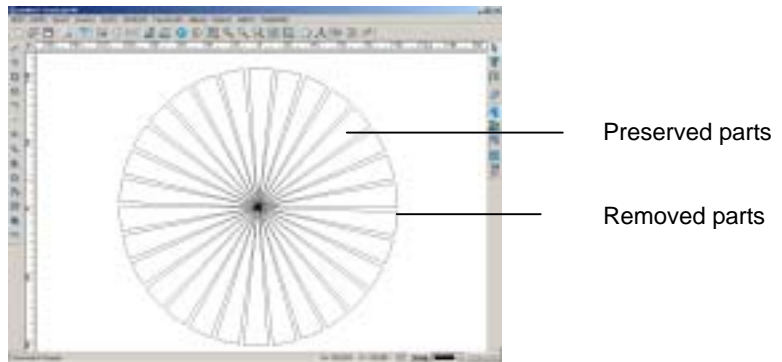



Fig. 6-28

6.10 Divide

Divide is to separate an object into several parts by defining dividing points.

To divide an object

1. Select the object to be divided.
2. Click on the icon  in Modification Bar or click **Modify->Divide**.
3. The words **Please input the number of divisions** are shown in the status bar.
4. Type a value and press Enter.

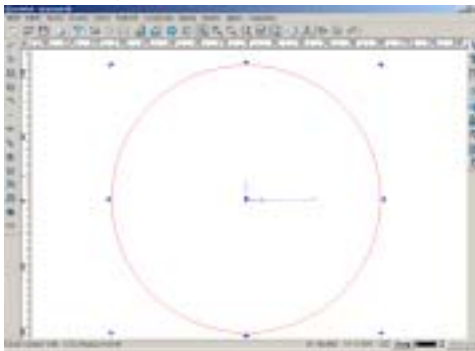


Fig. 6-29a (original)

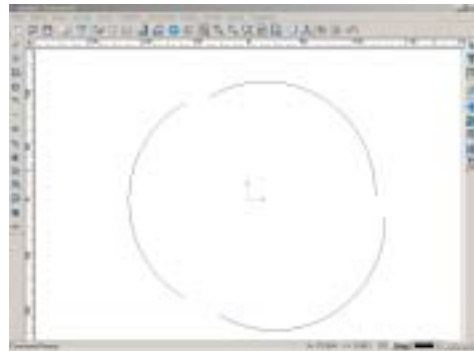


Fig. 6-29b (after being divided)

6.11 Boolean Operation

Boolean operation includes join, common, not common and subtract.

Take the following graph as an example.

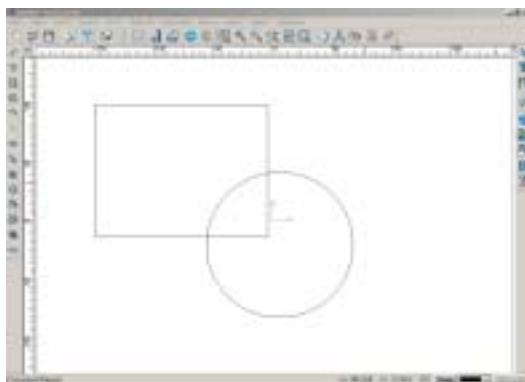



Fig. 6-30

Join

1. Select the two objects to be joined.
2. Click on the icon  on **Modification Bar** or click **Modify->Boolean Operation->Join**. The result is shown below.

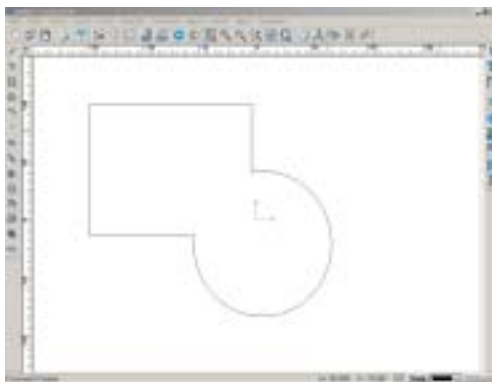



Fig. 6-31

Common

1. Select two objects.
2. Click on the icon  on **Modification Bar** or click **Modify->Boolean Operation->Common**. The result is as follows.

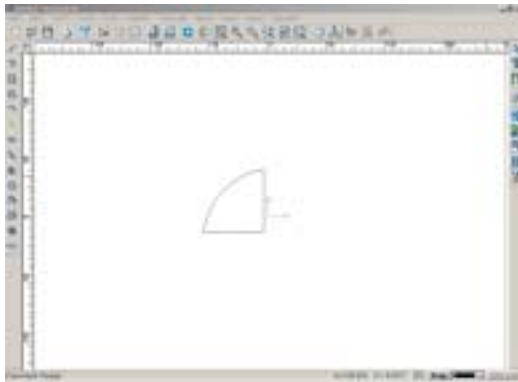



Fig. 6-32

Subtract

1. Select the two objects.

2. Click on the icon  on **Modification Bar** or click **Modify->Boolean Operation->Subtract**,

If you select then rectangle before selecting the circle, the result is shown in Fig. 6-33; if you select the circle first and then select the rectangle, the result will be as shown in Fig. 6-34.

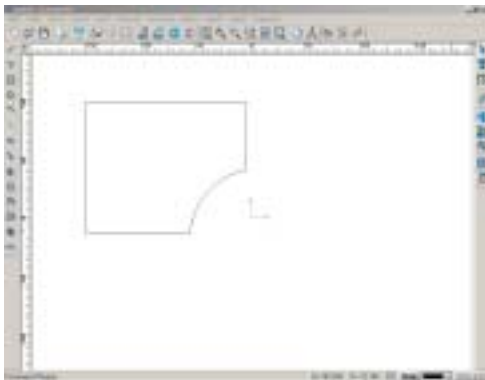


Fig. 6-33

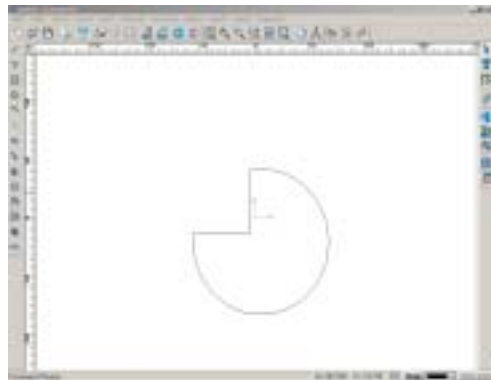



Fig. 6-34

Not common

1. Select the two objects.

2. Click on the icon  on **Modification Bar** or click **Modify->Boolean Operation->Not Common**. The following is the result.

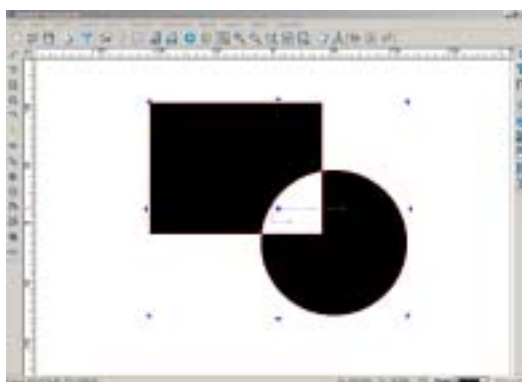



Fig. 6-35

6.12 Duplication

Array Duplication

1. Click on the icon  on **Modification Bar** or click **Modify->Duplication->Array Duplication**.
2. A dialog is displayed. (Fig. 6-36)

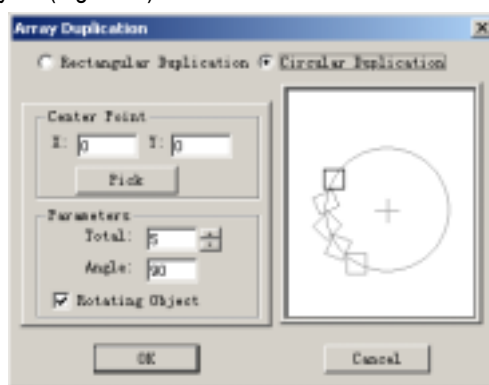



Fig. 6-36a (circular duplication)

Parameters in circular duplication include:

Center point: is to define the position of the center point of the circle. You can input the value directly in the boxes; or you can click on , and then click in the drawing window to fix the center point position of the circle.

Total: is the total number of the objects to be duplicated.

Angle: is the angle formed by the first and last duplicated object on the circle.

Rotating object: is to rotate the duplicated object.

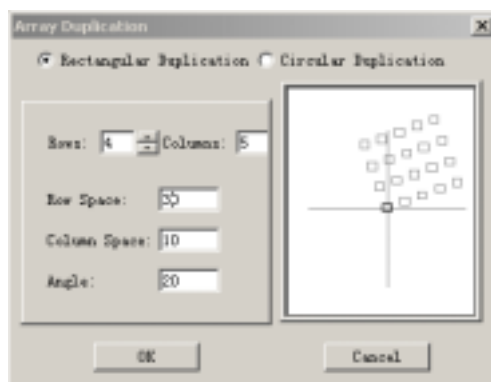


Fig. 6-36b (rectangular duplication)

Parameters in rectangular duplication include:


Row: is the number of rows.

Column: is the number of columns.

Row Space: is the space between every two rows.

Column Space: is the space between every two columns.

Angle: is formed by the bottom row and the positive direction of X axis.

3. After entering the values, click on the icon  or the Enter key to finish the setup.

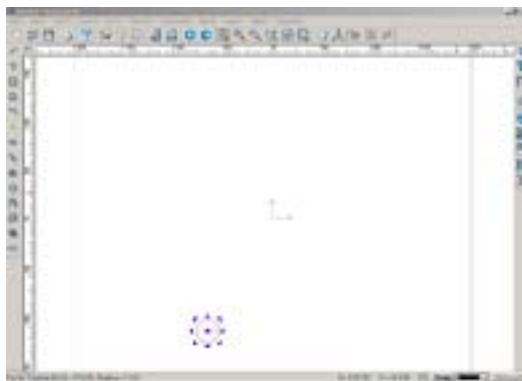


Fig. 6-37a (draw a circle)

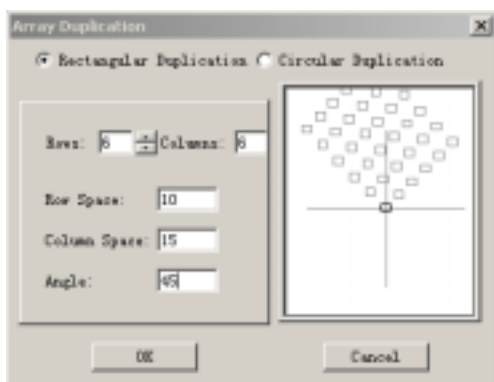


Fig. 6-37b (set the value)

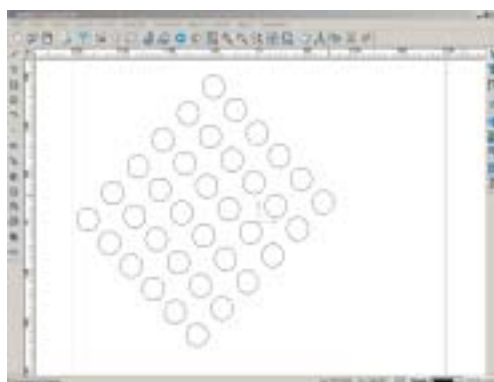


Fig. 6-37c (the result)

REMARK: The value of row space and column space can be negative numbers; it means that the duplicated objects will be placed in the negative X-axis direction.

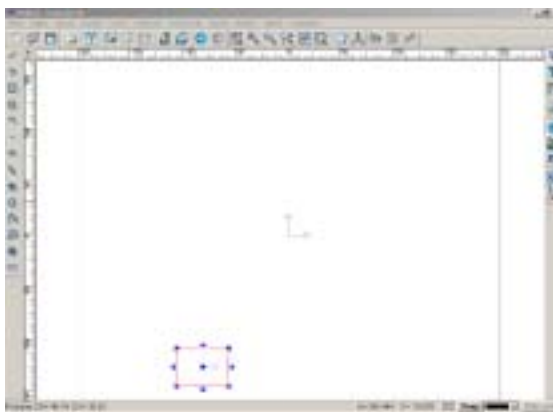


Fig. 6-38a (original)

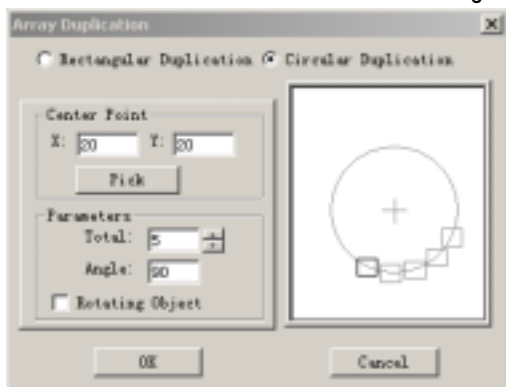


Fig. 6-38b (set the parameters)

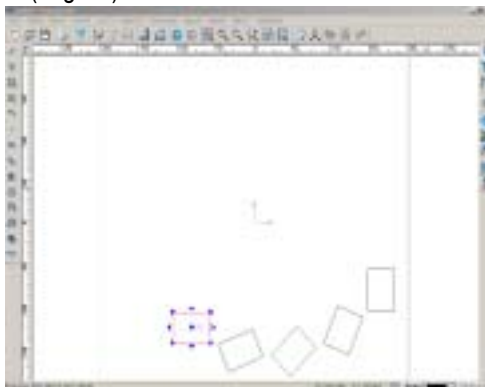



Fig. 6-38c (the result)

Duplication along a curve

This is to duplicate the selected object along a curve.

1. Draw a curve.
2. Select the object to be duplicated.
3. Click **Modify->Duplication->Duplication along A Curve**.
4. The words **Please select a curve** are shown in the status bar.
5. Move the cursor onto the curve.
6. When the cursor changes into  , click the left mouse button. A dialog is displayed. (Fig. 6-39)

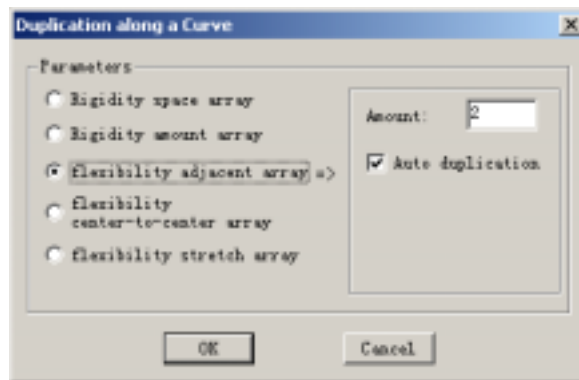


Fig. 6-39

Parameters include:

Rigidity space array: The object is duplicated along the curve with the same distance between each two objects.

Rigidity amount array: The amount is the total amount of the objects duplicated to the end of the curve with the same distance between each two objects.

Flexibility adjacent array: Check "Auto duplication" and then the object is duplicated along the curve with their centers on the line. If you do not check "Auto duplication", then the object is duplicated according to the actual amount you set in the **Amount** box. The object is duplicated with no space between each two of them.

Flexibility center-to-center array: The object is duplicated along the curve with the same distance between the centers of each two objects.

Flexibility stretch array: The object is duplicated automatically with objects all along the curve.

7. After setting the parameters, click on  to end the setup.

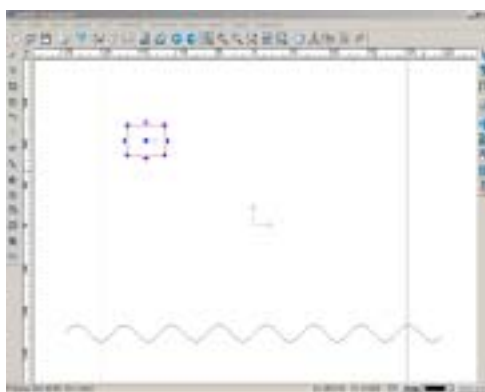


Fig. 6-40a (select the object)

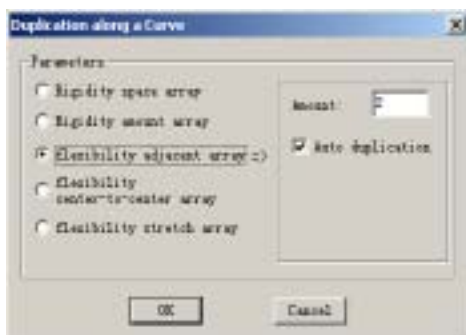


Fig. 6-40b (set the parameters)

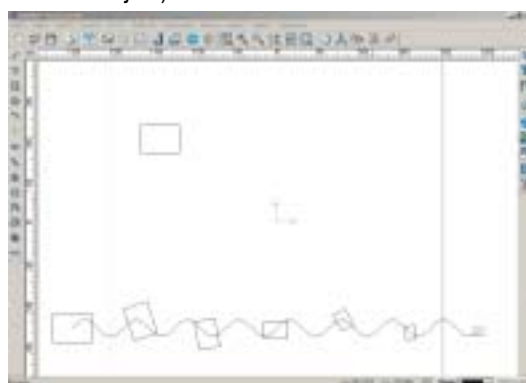


Fig. 6-40c (the result)

Duplication along a Line

This is to duplicate an object along a line.


1. Select the object to be duplicated.
2. Click on the icon  on Modification Bar or click **Modify->Duplication->Duplication along a Line**.
3. A dialog is displayed. (Fig.6-41)



Fig. 6-41

Space: is the distance between each two duplicated objects.

Amount: is the number of the duplicated objects.

Scaling: is the ratio of the size of the first duplicated object and the last duplicated object to that of the original object.

Refresh: is to validate the setting.

4. Set the values and click on **Refresh**.

5. Click in the drawing window to select the position of the first duplicated object. Move the mouse to the desired position.

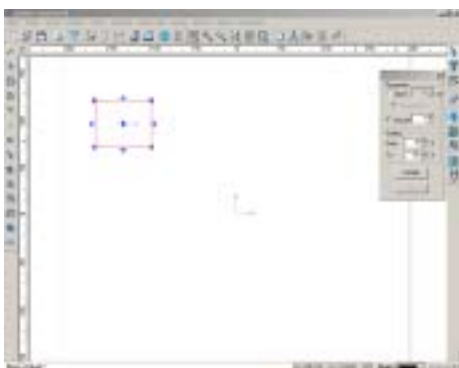


Fig. 6-42a (enter the value)

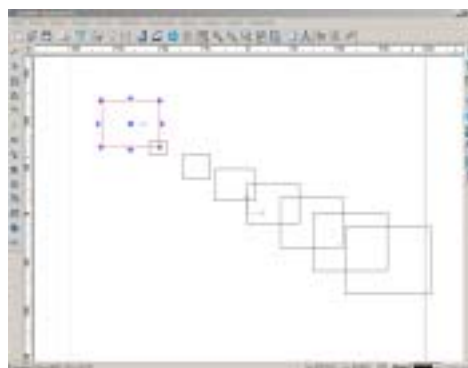



Fig. 6-42b (the result)

Duplication along an Arc

1. Select the object to be duplicated.
2. Click on the icon  on the **Modification Bar** or click **Modify->Duplication->Duplication along an Arc**.
3. A dialog is displayed. (Fig. 6-43)

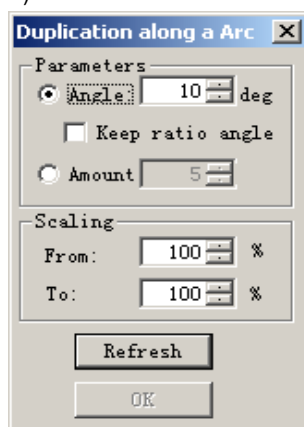


Fig. 6-43

Parameters include

Angle: is formed by every two duplicated objects close to each other.

Keep Ratio Angle: by selecting this function, the duplicated objects are positioned vertically to the arc.

Amount: is the number of the duplicated objects.

Scaling : is the ratio of the size of the first duplicated object and the last duplicated object to that of the original object.

Refresh : is to validate the setting.

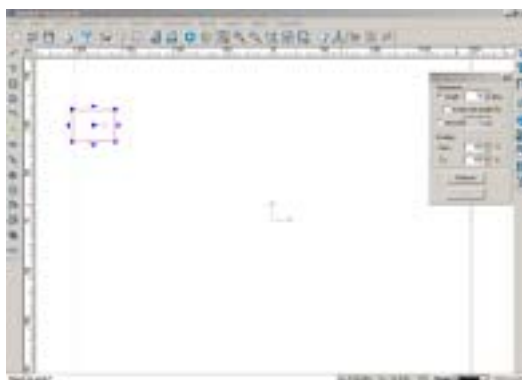


Fig. 6-44a (original)

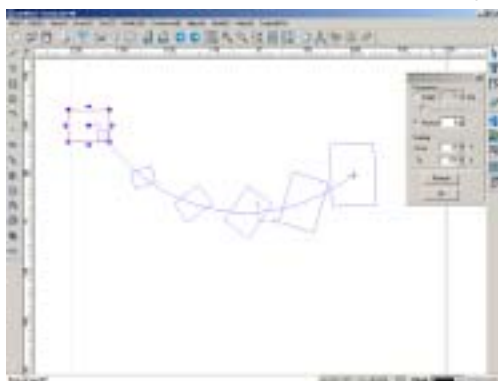


Fig. 6-44b (enter value)

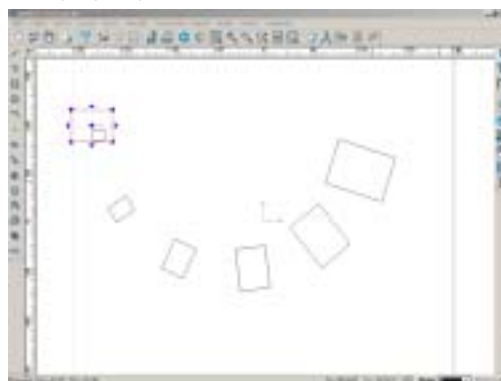



Fig. 6-44c (the effect)

Duplication along a Spiral Curve

1. Select the object to be duplicated.
2. Click on the icon  on Modification Bar or click **Modify->Duplication->Duplication along a spiral curve**.
3. A dialog is displayed. (Fig. 6-45)

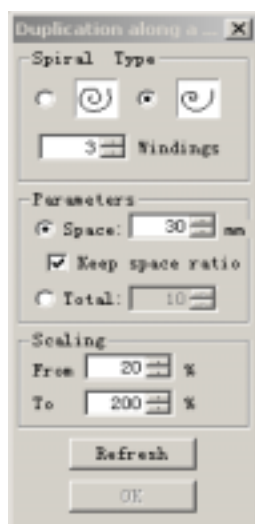


Fig. 6-45

Parameters include

Space: is the distance between each two duplicated objects.

Keep space ratio: means the space between the objects is adjusted automatically.

Amount: is the number of the duplicated objects.

Scaling: is the ratio of the size of the first and last duplicated object to that of the original object.

Refresh: is to validate the setting.

4. Enter the values and then click the left mouse in the drawing window to select the position of the center of the spiral.

5. Move the mouse until the desired result is reached. Then click the left mouse button in the drawing window to end the setup.



Fig. 6-46a (original)



Fig. 6-46b (input parameters)

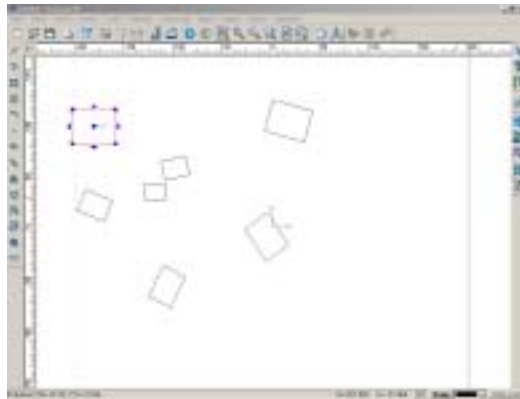



Fig. 6-46c (the effect)

6.13 Group & Ungroup

You can group several objects so that they behave as one unit. Grouped objects can be deleted, moved or transformed as a single entity. You can add objects to an existing group, and ungroup them when you want to edit them individually.

To group several objects

1. Select the objects to be grouped.
2. Click on the icon  on Modification Bar or select **Modify->Group**.

Then the objects are grouped.

6.14 Block

Block is to group objects of different properties to be one object. Objects that can be blocked include graphs, tool paths, text, etc.

Click **Modify->Block** on the menu bar to block the objects. Click **Modify->Unblock** on the menu bar to unblock the objects.

6.15 Object Properties

To adjust object properties

1. Select an object.
2. Click **Edit->Object Properties**.
3. A dialog is displayed. (Fig. 6-47)
4. Change the coordinate value of X and Y-axis in the dialog to change the shape of the graph.

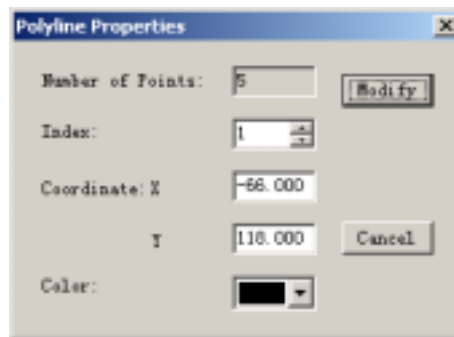


Fig. 6-47

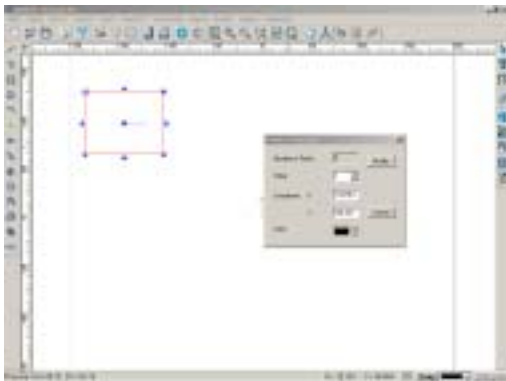


Fig. 6-48

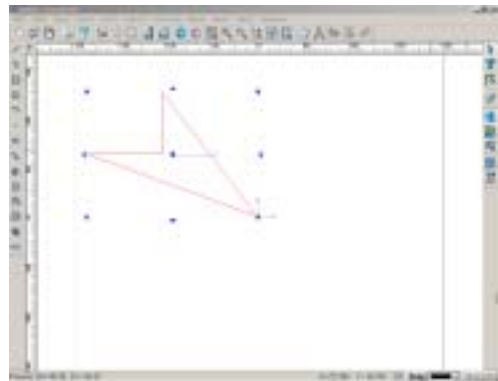



Fig. 6-49 (the shape is changed)

You can change the color of the object by

1. Select the object to be edited.
2. Click **Edit->object properties**.
3. Click on  or the dragdown menu (the color box is also available on the right of the status bar).
4. The color selection box is shown. (Fig. 6-50)

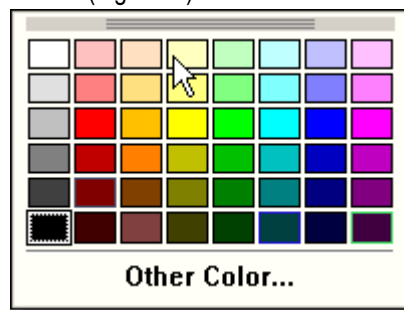


Fig. 6-50

To choose other colors, click on **Other Color**.



Fig. 6-51

REMARK: The setup of properties of different objects varies. Try to find out the differences by setting the properties of different objects.

CHAPTER SEVEN TEXT EDITING

This chapter is devoted to a general introduction of the usage of text editing in Ucamcam V8.

7.1 Text Input

7.1.1 Rapid Input

To improve text inputting speed, you can apply Rapid Input.


1. Click on the icon  on Text Editing Bar or click Text->Rapid Input.
2. A dialog is displayed. (Fig. 7-1)



Fig. 7-1


3. Input the text, and click on .
4. The words **Start of text** are displayed in the status bar. Input the coordinate value and press Enter or just click in the drawing window to designate the starting position of the text, then the text is shown in the designated place.



Fig. 7-2a (input the text)

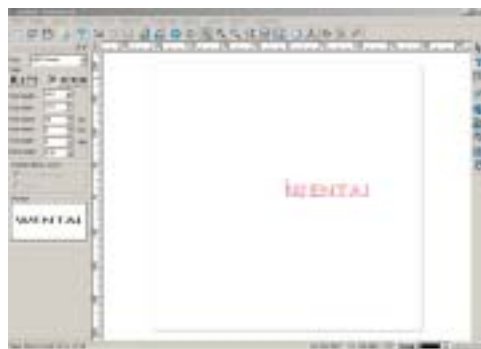



Fig. 7-2b (after inputting the start coordinate)

REMARK: You can copy the text in other software (e.g. Word) to the dialog Rapid input by pressing Ctrl + C and Ctrl + V.

7.1.2 Editing Input

There are three ways to enable this function.

- Click on the icon  on the Editing Tool Bar.
- Click Text->Edit.
- Press Ctrl + T.

Then the editing input box is displayed on the left of the screen.

Click the left mouse button in the drawing window to start text input. (Fig. 7-3)

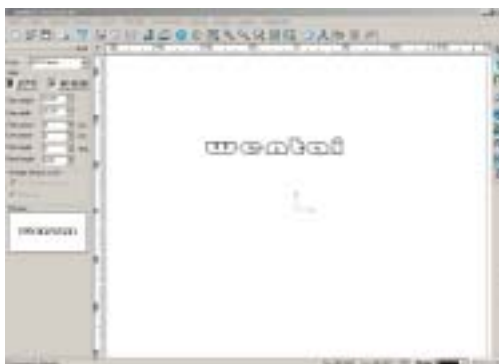


Fig. 7-3

REMARK: Properties of the text can be set either before or after input of the text.

7.2 Text Editing

7.2.1 Font Selection

Ucam V8 provides you with various font types. But note all the font properties should be set after entering Editing Input mode.

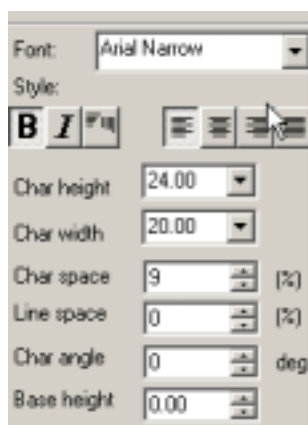


Fig. 7-4

7.2.2 Character Height & Width

1. Select the word(s) to be edited.
2. Input values in the list boxes of character width and character height or select the value from the dragdown windows. (Fig. 7-5)



Fig. 7-5a (select char width)

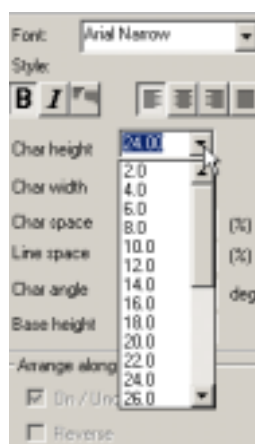



Fig. 7-5b (select char height)

REMARK: The value which has been input will be automatically remembered in the dragdown windows. When inputting the value of char height, the value of char width will change in proportion automatically, but when inputting character width, the value of char height will not change. The range of the value of char width and height should be within 0 to 99999.

7.2.3 Overstriking

1. Select a text.
2. Click on the icon , then the selected text will be overstricken. (Fig. 7-6)

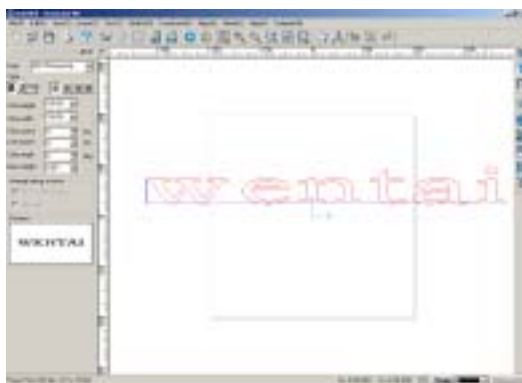



Fig. 7-6

7.2.4 Incline

To incline a text

1. Select a text.
2. Click on . Then the text will be inclined. (Fig. 7-7)

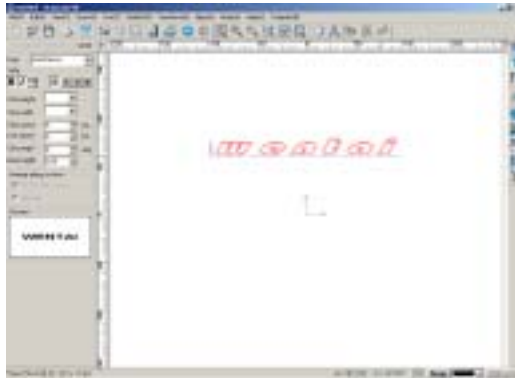



Fig. 7-7

7.2.5 Vertical Text Flow

1. Select a text.
2. Click on the icon . (Fig. 7-8)

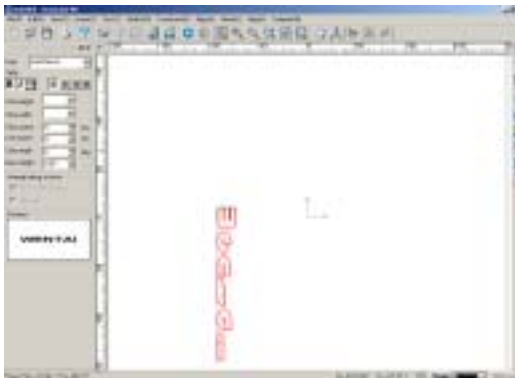


Fig. 7-8

7.2.6 Character Space & Line Space

Character space means the distance between each two characters; line space is the distance between every two lines.

To set character space and line space

1. Select the characters.
2. Input the value in the list boxes of Char Space and Line Space or select from the dragdown boxes. (Fig. 7-9)

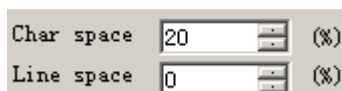




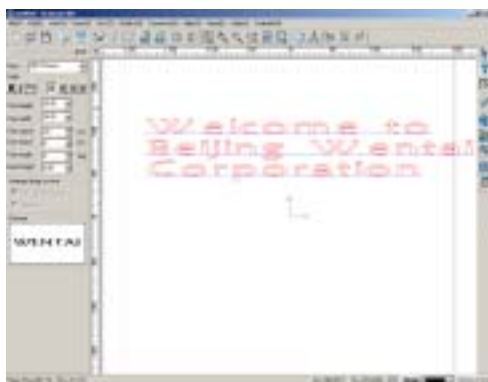


Fig. 7-9

7.2.7 Align

1. Select the words to be aligned.
2. We can see four icons:  (align on left),  (align on center),  (align on right), and  (fill). Click on one of them. The result is shown below.



F7-10a (align on left)

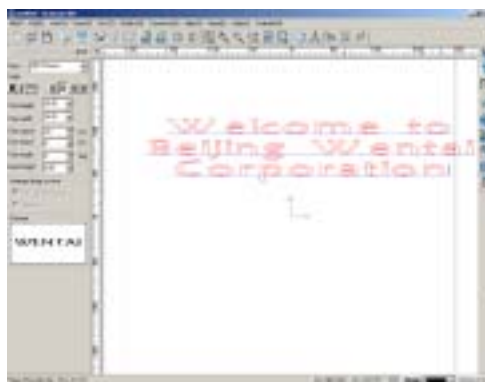


Fig. 7-10b (align on center)

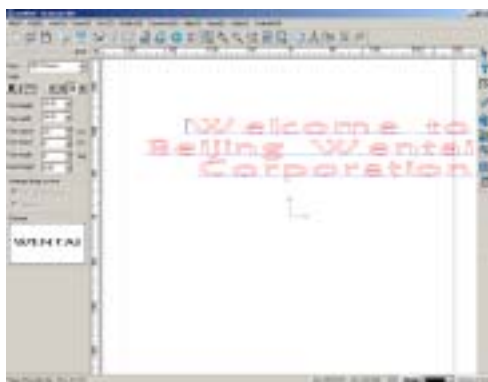


Fig. 7-10c (align on right)

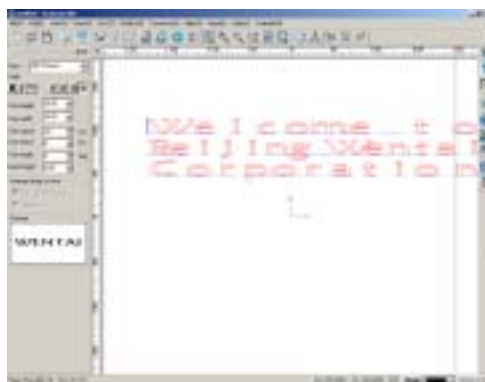


Fig. 7-10d (fill)

7.2.8 Text Rotate

There are two ways to rotate a text.

- Rotate with the mouse

1. Exit the text edit mode.
2. Follow the steps in 5.2.3 in Chapter Five to rotate the text.

- Input the value of angle

1. Select the text to be rotated.
2. Enter the Editing Input mode.
3. Type a value in char angle or select a value from the dragdown box. (Fig. 7-11)

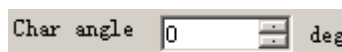


Fig. 7-11

7.2.9 Base Height

Sometimes the text is not on the same horizontal line. (e.g. "2²") In this case, we can adjust the distance between the base line and the character by setting the parameters of baseline. Input the value in the dialog or select a value from the dragdown box. (Fig. 7-12)



Fig. 7-12

Steps are as follows

1. Select one or more objects.
2. Type a value in the Base height box or select a value from the dragdown box.

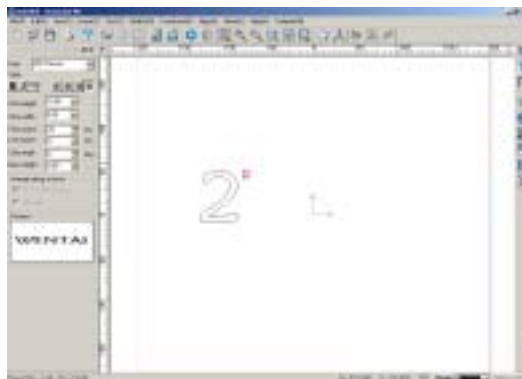



Fig. 7-13

7.3 Text Along A Curve

Text Along A Curve is to put a text on a curve. There are two ways to enable this function.

Method 1.

1. Input a text, and draw a curve.
2. Select both the curve and the text.
3. Click the icon  on Text Editing Bar or click Text->Text along A Curve.

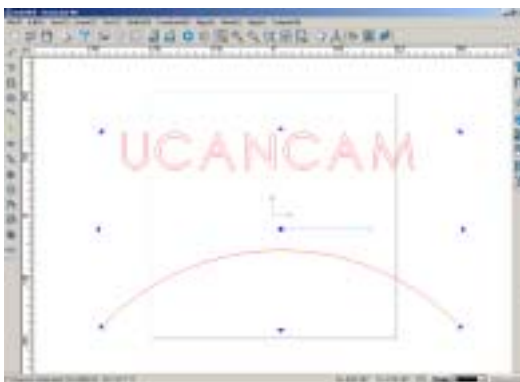


Fig. 7-14a (select the text and the curve)



Fig. 7-14b (the text is put along the curve)

As we can see in Fig. 7-14b, the length of the text is not equal to that of the curve, so the text is not put in full length on the curve. Enter **Editing Input** mode and adjust the value in **Char Space**, the result is shown in Fig. 7-15.

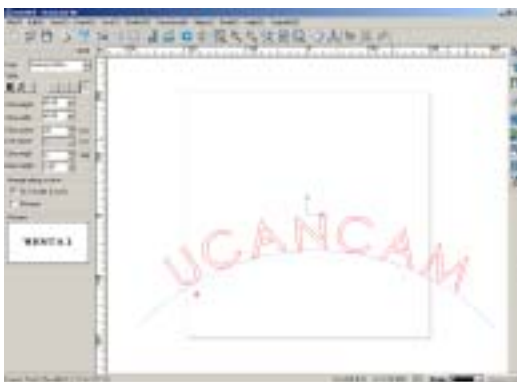


Fig. 7-15


In Fig. 7-15, we can see that there is a little red circle under the first letter U. Move the cursor onto the little red circle. When the cursor changes into “”, hold the left mouse button and drag it to reselect the starting point of the text on the curve. (Fig. 7-16)



Fig. 7-16

You can also put the text under a curve or in reversed direction.

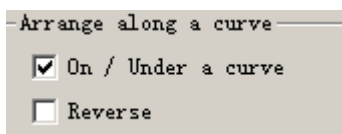


Fig. 7-17

Deselect On/Under a curve to put the text under the curve.

Text
direction on
a curve

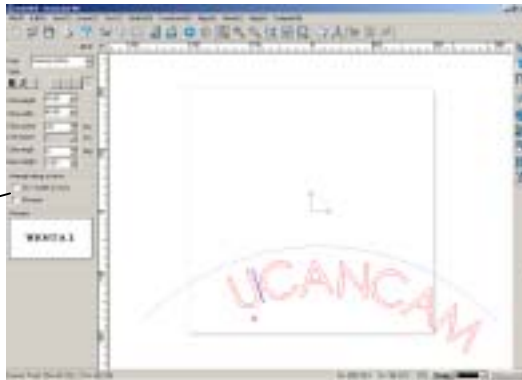


Fig. 7-18

Tick Reverse, and the text will be put in reverse direction. (Fig. 7-19)

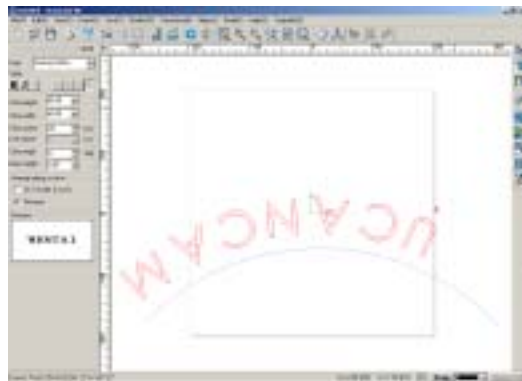



Fig. 7-19

Method 2.

1. Type a text and draw a curve.
2. Enter the Editing Input mode.
3. Put the cursor onto a curve.
4. When the cursor changes into , move the cursor to select the starting point of the text on the curve.
5. Click the left mouse button, and the glinting cursor appears on the curve.
6. You can input the text on the curve now. (Fig. 7-20)

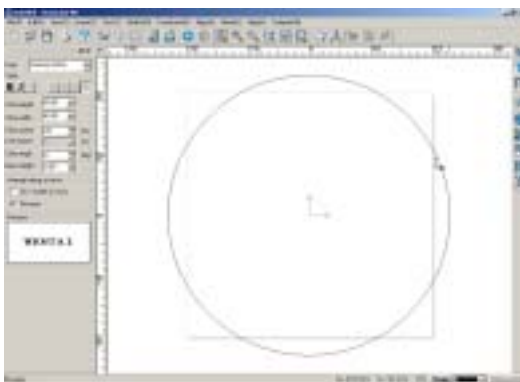


Fig. 7-20a (the cursor changes into \overline{AB})

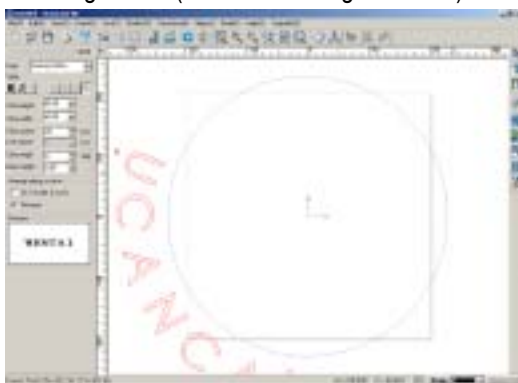


Fig. 7-20b (input the text)

After inputting the text, you can set the properties of the text with the same method as in method

1.

REMARK: The curve is not displayed in graph edit mode but only in text edit mode.

7.4 Hollow Character

This function is to make hollow characters. Follow the steps below:

1. Exit Editing Input mode
2. Select the text to be hollowed.
3. Click Text->Hollow Characters.
4. A dialog is displayed. (Fig. 7-21)

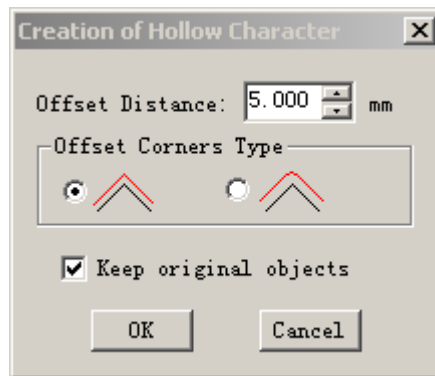


Fig. 7-21

Parameters include:

Offset Distance: the value by which the text is to be extended.

Offset corners type: is the shape of the corner, including acute angle and round angle.

Keep original objects: is to preserve the original text in the drawing window after operation.

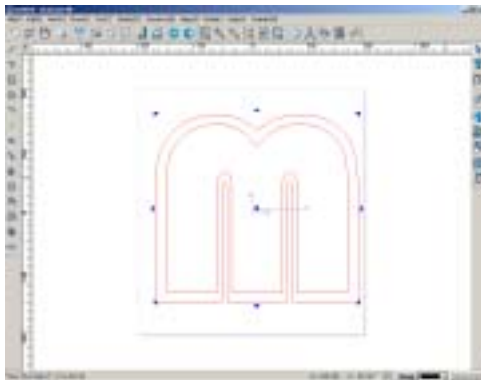


Fig. 7-22a (original)

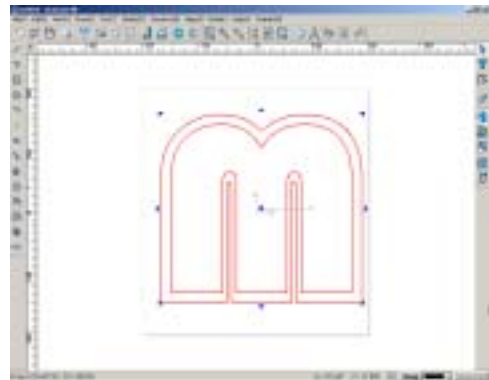


Fig. 7-22b (the effect of hollow character)

7.5 Convert To Curves


1. Exit the Editing Input mode.
2. Select the text.
3. Click on the icon  on Text Editing Bar or click Text->Convert to Curves.



Fig. 7-23a (select the text)



Fig. 7-23b (the text is changed into individual units)

If we group two or more text and then ungroup them, the text can be changed into individual units.



Fig. 7-23c (input two line of texts)



Fig. 7-23d (select the texts to group them)



Fig. 7-23e (ungroup)



Fig. 7-23f (the text is changed into individual units)

If a text and a graph are grouped and then ungrouped, the text can also be changed into individual units. (Fig. 7-24)



Fig. 7-24a (select text and graph)



Fig. 7-24b (ungroup)



Fig. 7-24c (the text is changed into individual units)

REMARK: The text which has been changed into graphs should not be adjusted using text editing tools.

7.6 Serial Number Text

When we are making breast cards, we need to change the serial numbers on the card. With Serial Number Text function, this is made easier.

1. Select Text->Serial Number Text.
2. A dialog is displayed. (Fig. 7-25)



Fig. 7-25

Parameters include:

Serial number input

Start: is the value of the first serial number.

End: is the value of the last serial number.

Step: is the value gap between each two adjacent serial numbers.

Total: is the total amount of the serial numbers

Format: is the digit of the serial numbers

Text input

Front text: is the text before the serial numbers.

Back text: is the text after the serial numbers.

Array

Amount per row: is the amount of serial number text in each row.

Amount per column: is the amount of serial number text in each column.

Row space: is the space between each row.

Column space: is the space between each column.

Click on **Preview** to preview the effect.

Click on **OK**, and input the start coordinate of the text in the status bar or simply click the left mouse button in the drawing window to fix the position of the first serial number text.



Fig. 7-26a (input the value)



Fig. 7-26b (input the coordinate)

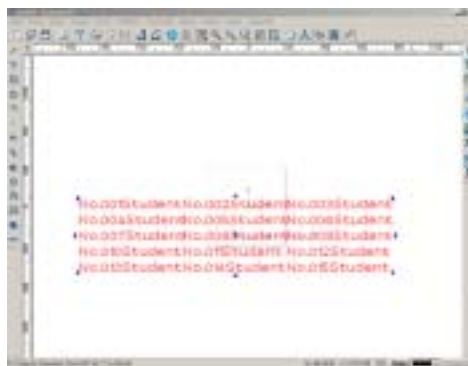


Fig. 7-26c (the effect)

7.7 Text Symbol

Various symbols and characters are available for use with Text Symbol.

1. Click Text->Text Symbol in the menu bar, and a box appears on the left.
2. Click on a symbol, hold the mouse button, and then drag it into the working area for use.



Fig. 7-27

7.8 Replace

You can replace a letter with another one with Replace. Follow the steps below.

1. Choose the letters.
2. Click Text->Replace in the menu bar, and a dialogue box appears. (Fig. 7-28)
3. Enter the letter or some sequence letters to be replaced in **FIND WHAT**; enter the letter or letters in **REPLACE WITH**. And click on **OK**.

Then the letters are replaced.

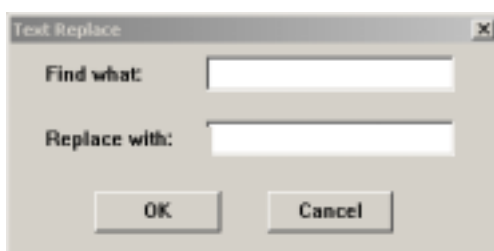


Fig. 7-28

7.9 Single Stroke

Follow the steps below.

1. Choose a letter or several letters
2. Click Text->Single Stroke in the menu bar. Then single stroke is created.

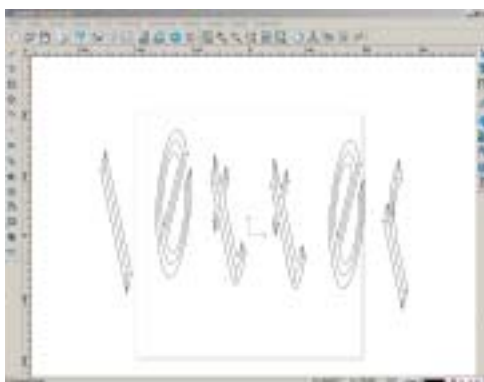



Fig. 7-29

7.10 Text in a closed shape

You can input text in a closed shape.

1. Draw a closed shape

2. Click  to enter Text mode

3. Move the cursor to the shape. When the cursor changes to , click the left mouse button. And then you can type in text in the closed shape.

CHAPTER EIGHT NODE EDIT

With Ucamcam V8 software, you can draw lines, arcs, polylines, circles, ellipses, curves, etc. The shape of a curve is determined by four points: two end points and two controlling points. (Fig. 8-1) The shape of a curve can be changed by changing the position of the end points and the controlling points.

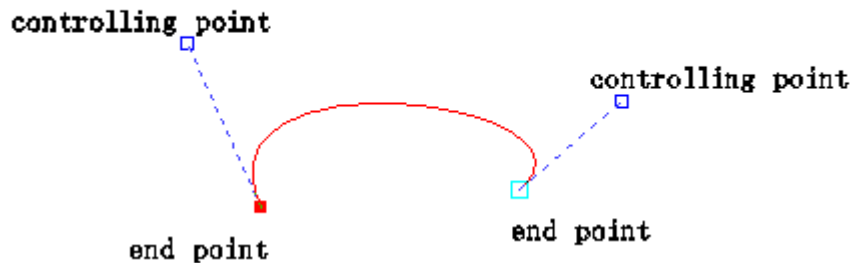


Fig. 8-1

Functions in node editing include: add, delete, disconnect, connect, close, convert to line, convert to curve, cusping, smooth, symmetry, node align, start point, auto remove points, fillet, chamfer, and vertical.

8.1 Node Selection And Move

There are two ways to select a node.

- To select one node, click the node or click the right mouse button to display the context menu in node editing mode.
- To select several nodes, drag the mouse to form a box around the nodes, or click the nodes one after another while pressing the **Shift** key, and end the operation by releasing the **Shift** key.


To move a node

1. Select the node
2. Click the left mouse button on the node. Hold and drag the mouse to move the node. (A node can be moved horizontally or vertically by pressing the **Ctrl** key at the same time.)

8.2 Add & Delete A Node

To add a node

1. Enter the node editing mode.
2. Click on the location where you are going to put the new node.
3. A black dot appears in this position.

4. Click the icon  on Node Editing Bar or click Node->Add.
5. A new node is added in the selected position.

You can add a node by double clicking the left mouse button . (Fig. 8-2, Fig. 8-3)




Fig. 8-2



Fig. 8-3

To delete a node

1. Select a node.
2. Click on the icon  on Node Editing Bar or click node->delete.

Nodes can also be deleted by double clicking the left mouse button. (Fig. 8-4 is the effect after deleting two nodes from Fig. 8-2.)

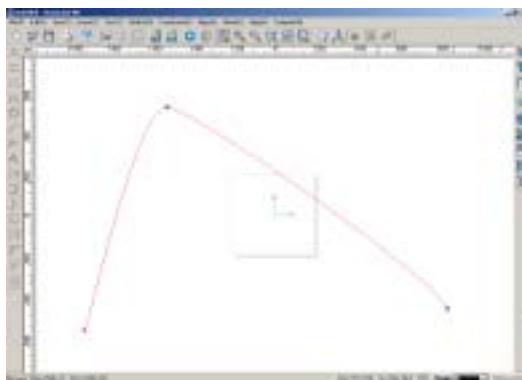



Fig. 8-4

To add or delete several nodes at the same time


1. Select several nodes.
2. Click on the icon  on Node Editing Bar or click Node->Delete.

REMARK: Nodes of circles and ellipses can not be deleted.

8.3 Cusping & Smooth

Cusp and smooth are the two types of relative positions between nodes and their controlling points. When one of the two controlling points is moved, the other one is moved accordingly to make the curve smooth. A node and its two controlling points are not put on the same line by applying **cusping** function. When moving one of the two controlling point, the other one is not moved, thus making the curve acute. **Smooth** and **Cusping** are only applied to Bezier.

To cusp a node

1. Enter Node Editing mode.
2. Select the node to be edited.
3. Click on the icon  on the Node Editing Bar or click Node->Cusping.
4. Move the controlling points by dragging the mouse. (Fig. 8-5)

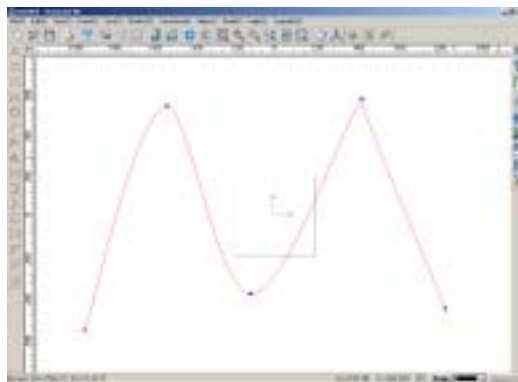



Fig. 8-5

To smooth a node

1. Enter Node Editing mode.
2. Select the node.
3. Click on the icon  on Node Editing Bar or click Node->Smooth.

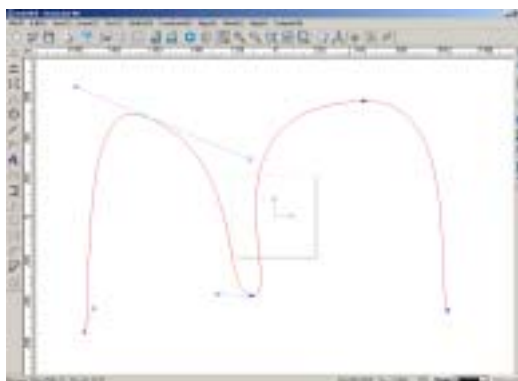


Fig. 8-6


You can change the shape of the curve by changing the position of the controlling points. (Fig. 8-7)



Fig. 8-7

REMARK: Smooth function should only be applied to acute nodes, and cusping operation is only valid to smooth nodes.

8.4 Symmetry

1. Enter Node Editing mode.
2. Select the nodes.
3. Click on the icon  on the Node Editing Bar or click Node->Symmetry.
4. Move the controlling points by dragging the mouse.

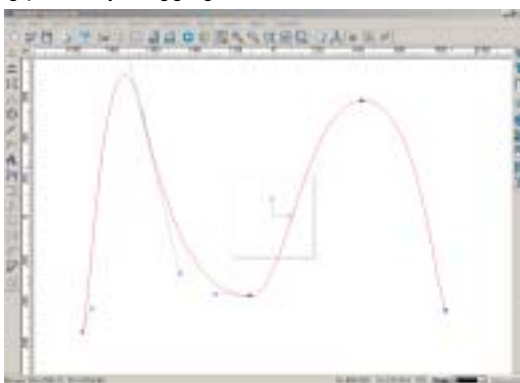



Fig. 8-8

8.5 Node Align

Node Align is to align the selected nodes horizontally or vertically.

1. Enter Node Editing mode.
2. Select the nodes.

3. Click on the icon  on Node Editing Bar.
4. A dialog in Fig. 8-9 is shown.
5. Select the way you want to align the nodes, and then click OK.

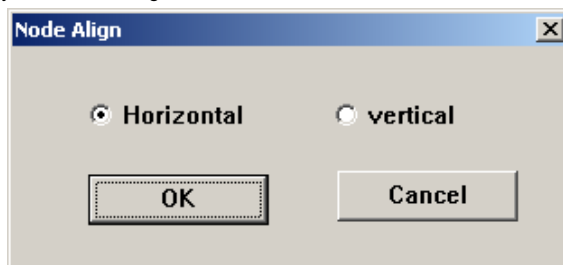


Fig. 8-9

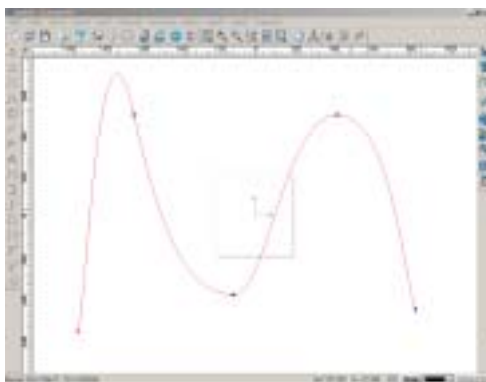


Fig. 8-10 (horizontal align)

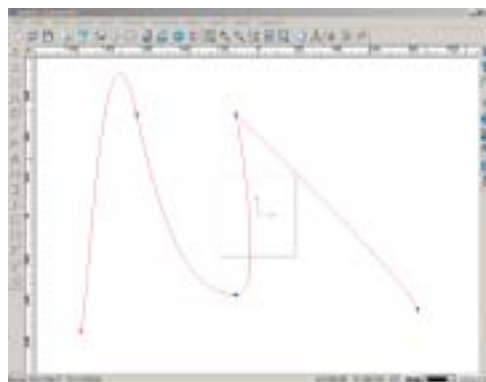



Fig. 8-11 (vertical align)


REMARK: The number of nodes to be aligned must be two or above; otherwise the operation is invalid.

8.6 Convert To Line & Convert To Curve

Convert to line

1. Enter Node Editing mode by clicking  on the right of the screen or by clicking Node->Node Tools on the menu bar.

2. Click on the shape to display its nodes.
3. Select a node.

4. Click on the icon  on the Node Editing Bar or click Node->Convert to line.

Then the curve between the selected node and the node right after it is converted to a line.

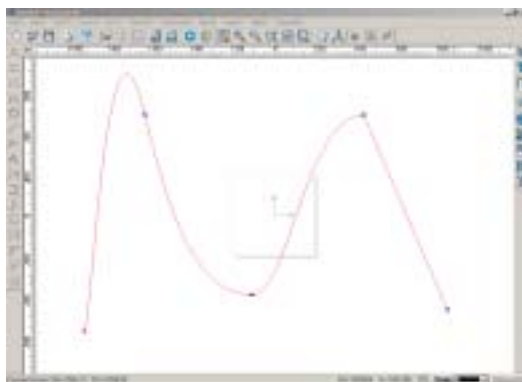


Fig. 8-12

REMARK: When the selected node is the end point of the curve, the curve between the end point and the node right before it is changed into a line.

Convert to curve

1. Enter Node Edit mode.
2. Select the nodes to be edited.
3. Click on the shortcut icon  on the Node Editing Bar or click **Node->Convert to curve**.

8.7 Disconnect & Connect

To disconnect a node

1. Select a node.
2. Click on the icon  on Node Editing Bar or click **Node->Disconnect**.

Then the node is disconnected.

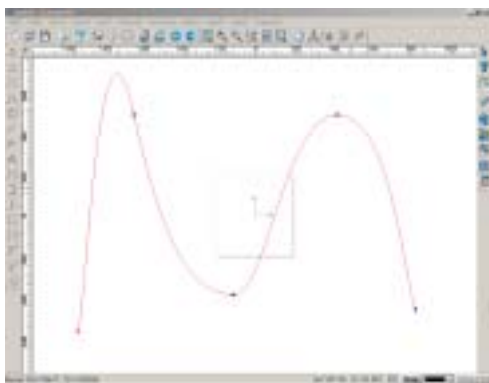


Fig. 8-13a (original)

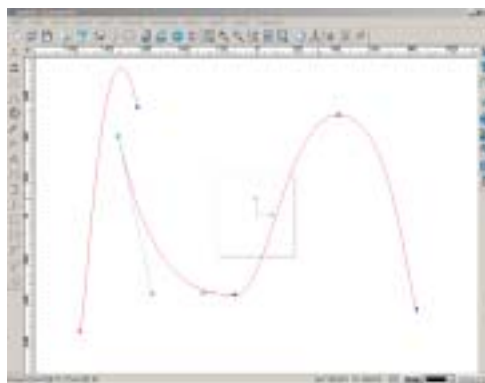


Fig. 8-13b (after disconnecting the node)

To connect nodes

1. Select the nodes to be connected.

- Click on the icon  on the Node Editing Bar or click Node->Connect.

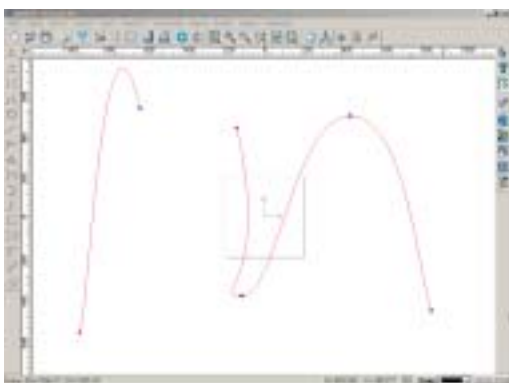


Fig. 8-14a (original)

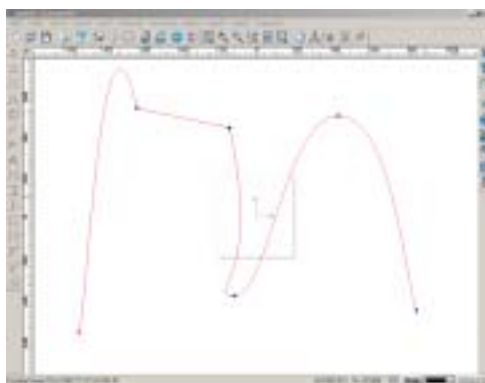



Fig. 8-14b (after being connected)

REMARK: The connect function is only valid when connecting two starting points, or two end points or one starting point and one end point.

8.8 Close

Close is to connect the starting point and the end point of a curve to change the curve into a close one.

- Select the curve to be closed by clicking on one of its nodes.
- Click on the icon  on Node Editing Bar.
- Select Node->Close.

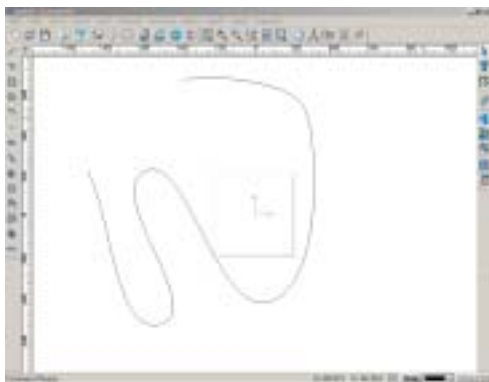


Fig. 8-15a (original)



Fig. 8-15b (after being closed)

8.9 Start point


- Select a node.

2. Click on the icon  on the Node Editing Bar or click **Node->Start point**.

REMARK: This function is valid only when the object to be edited is a close graph.

8.10 Auto Remove Points

With **Auto Remove Points** function, the number of nodes in a graph can be reduced without changing the shape of the graph, thus making node editing easier.

1. Select the nodes to be removed.
2. Click on the icon  on Node Editing Bar or click **Node->Auto Remove Points**. The nodes are removed from the graph.

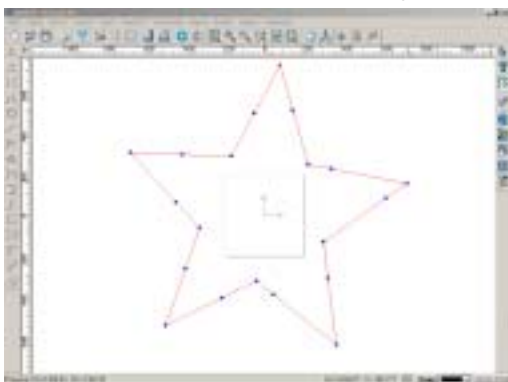


Fig. 8-16 (original)

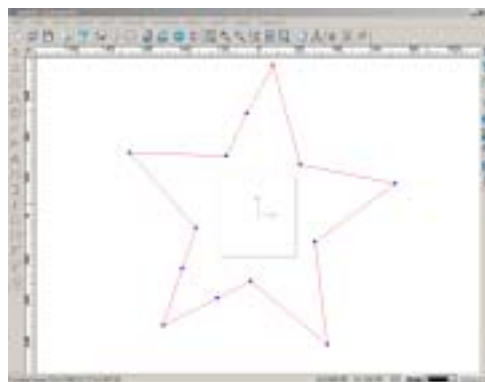



Fig. 8-17 (after removing some points)

You can apply this operation to either all the nodes or only some of the nodes.

8.11 Fillet

1. Select a node.
2. Click on the icon  on Node Editing Bar or click **Node->Fillet**.
3. A dialog (Fig. 8-18) is displayed.
4. Input the value of radius (Radius is the radius of the arc.) and click on **OK**.

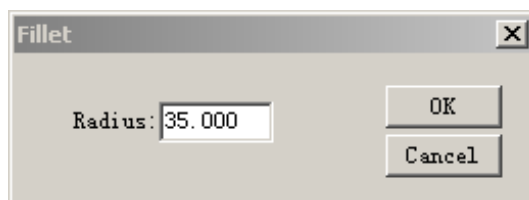


Fig. 8-18

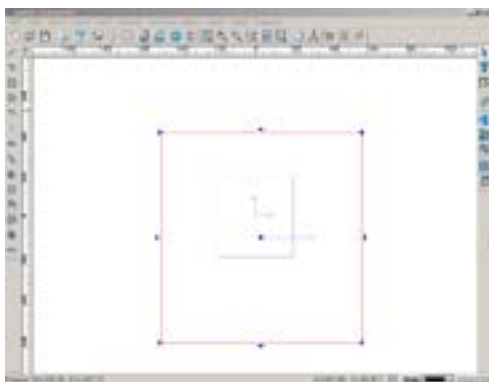


Fig. 8-19a (original)

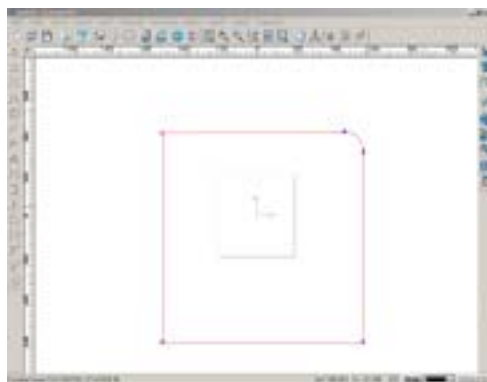



Fig. 8-19b (the effect)

REMARK: This function is only valid when editing acute angles.

8.12 Chamfer

1. Select the node to be edited.
2. Click on the icon  on the Node Editing Bar or click Node->Chamfer.
3. A dialog is displayed.
4. Input the value of Distance, and click on OK.

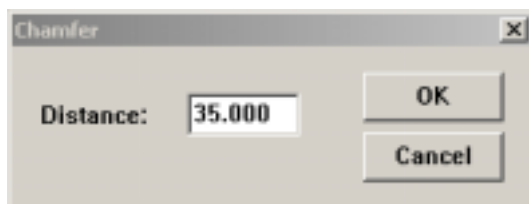


Fig. 8-20



Fig. 8-21a (original)

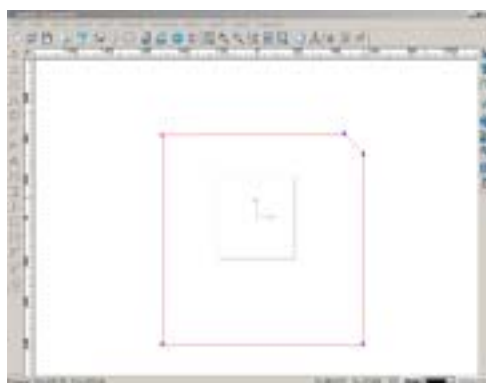



Fig. 8-21b (the effect)

8.13 Vertical

With this function, an acute angle can be changed into a right angle.

1. Select the node to be edited.
2. Click on the icon  on the Node Editing Bar or click Node->Vertical.

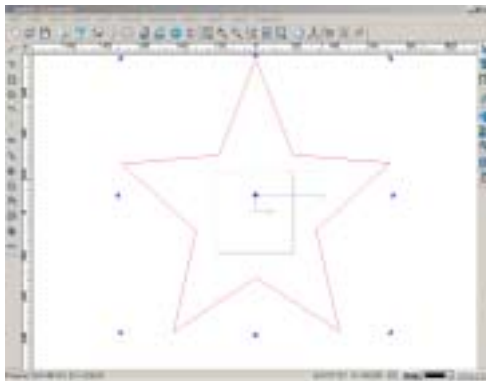


Fig. 8-22a (original)

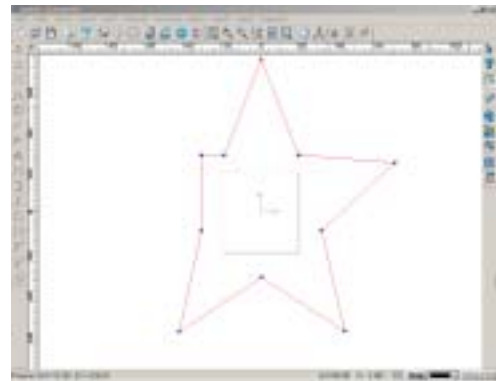


Fig. 8-22b (the effect)

CHAPTER NINE ADDITIONAL OPERATIONS

9.1 Image Processing

The system provides many image processing functions such as image scanning, image tracing, image stripping, adjusting brightness, adjusting contrast, and converting into grayscale image.

9.1.1 Image Scanning

Image scanning function can help you import images through scanner. Make sure that your computer and scanner are connected before scanning. Put the object in the scanner. Click File->Select Scanner in the menu bar, and then the following dialog is displayed.

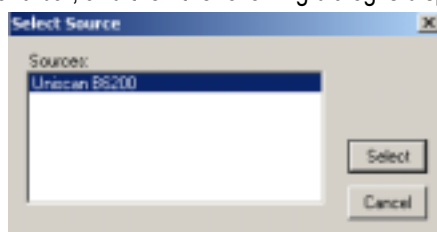


Fig. 9-1

The names of the scanners are displayed in the dialog, select one and click on select. Then click File->Image Scan in the menu bar, and a dialog is displayed. Select the object to be scanned and start scanning. (Fig.9-2)

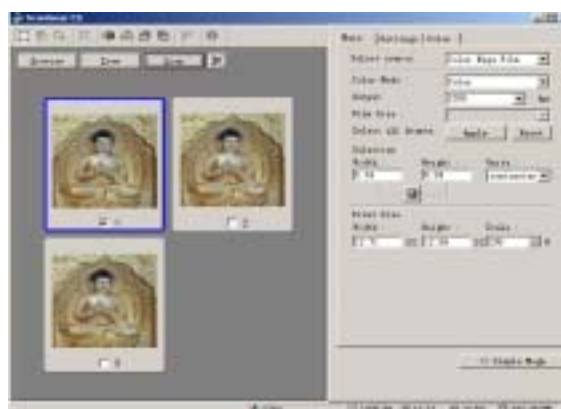


Fig. 9-2

9.1.2 Adjust Brightness

Select the image to be edited, then click File->Image processing->Adjust brightness in the menu bar and a dialog is displayed. Drag the slider in the dialog to adjust image brightness value.



Fig. 9-3 before adjusting



Fig. 9-4 after adjusting

9.1.3 Adjust Contrast

Select an image in the drawing window, then click **File->Image Processing->Adjust Contrast** in the menu bar, and a dialog is displayed. Drag the slider in the dialog to adjust the contrast of the image. (Fig. 9-5 and Fig. 9-6)



Fig. 9-5 (before adjusting)



Fig. 9-6 (after adjusting)

9.1.4 Convert Into Grayscale Image

Grayscale image is composed of pixel of binary digit, with 256 kinds of gray colors.

Select an image in the drawing window, then click **File->Image Processing->Convert into Grayscale Image** in the menu bar, and a multicolor image is changed into a grayscale image. (Fig. 9-7 and Fig. 9-8)




Fig. 9-7 (multicolor image)



Fig. 9-8 (grayscale image)

9.1.5 Image Tracing

Image tracing is a very important command and plays an important part in image engraving. It refers to getting the parameters of the contour of the image.

Select an image, and click on the shortcut icon  on Standard Bar or click File->Image Processing->Image Tracing in the menu bar, then the following dialog is displayed. (Fig. 9-9)

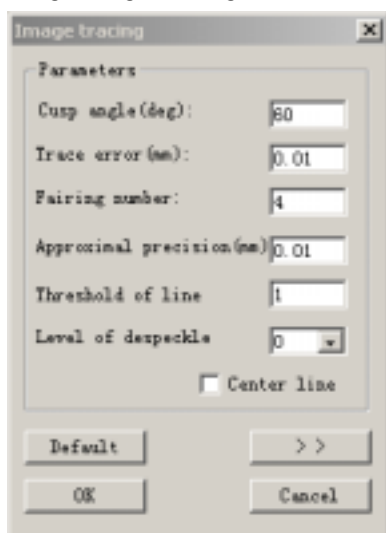


Fig. 9-9

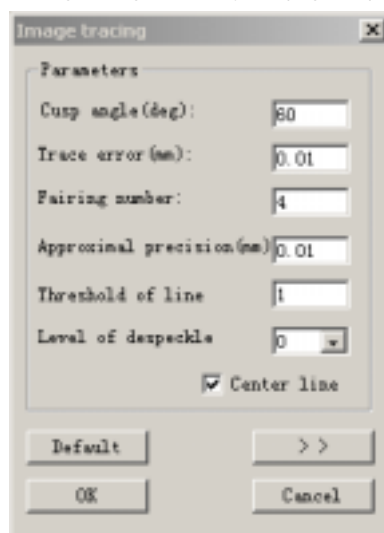


Fig. 9-10

The parameters in the dialog include:

Cusp angle: When tracing an image, the contour contains some cusp angles, and if we set the value at 60, then the angles above 60 degrees will be smoothed into curves, and those below 60 degrees will not be changed.

Trace error: The smaller the value of trace error is, the more accurate the contour is, and the longer the time of calculation is.

Fairing number: The times by which the curves are smoothed. The bigger the value is, the

better the effect is.

Approximal precision: The value is to set approximate image borders.

Threshold of line: If the bending level of the curve is less than this value, then the curve will be replaced by a line.

Level of despeckle: When importing images, there are probably unneeded spots left on the image. In order to remove these unwanted spots, we can set the level of despeckle to make the image clearer.

Center line: is to draw the center line of the contour of the graph.

Default: After changing the parameters, if you want to resume the default value, you should click on Default, and then the value returns to the default value.


Preview: Click on  to observe the result of the image tracing process.

The following is an example.

1. Click File->Import in the menu bar to import a file in BMP format. (Fig. 9-11)



Fig. 9-11

2. Select the image, and click on the shortcut icon  in Standard Bar or click File->Image Processing->Image Tracing in the menu bar. Then a dialog is displayed. (Fig. 9-12)

3. Keep the default value, and click on OK. Then the dialog Image Tracing is displayed. (Fig. 9-13)



Fig. 9-12



Fig. 9-13



Fig. 9-14

4. Wait for a moment, and then the effect is shown. (Fig. 9-15)

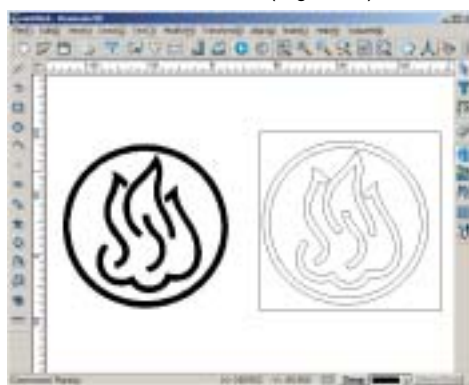


Fig. 9-15

5. The image is changed into vector graph after being processed, and you can now edit any part of it.

When choosing the center line, the effect is shown below. (Fig. 9-16)

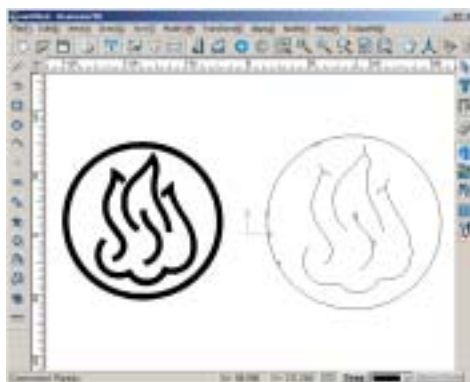



Fig. 9-16

9.1.6 Image Stripping

This is to display an image in stripe form, and the stripped image can be used in engraving. See the following example.

Import an image and click on the shortcut icon  on Standard Bar or select menu File->Image Processing->Image stripping in the menu bar. Then the following dialog is displayed. (Fig. 9-17)

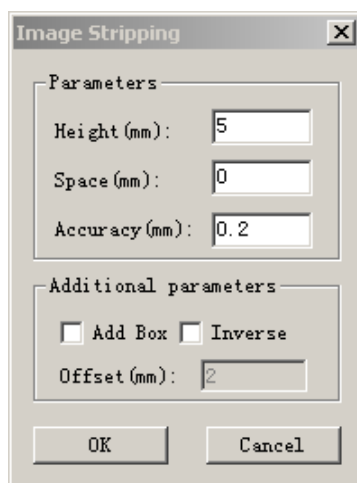


Fig. 9-17

Parameters include:

Height: the height of every strip of the image.

Space: the space between every two stripes.

Accuracy: the higher the value is, the more accurate the image is.

Additional parameters:

Add box: A box is added around the processed image if this function is started.

Inverse: The inversed image will be processed.

Offset: is the distance between the sides of the box and the edge of the image.

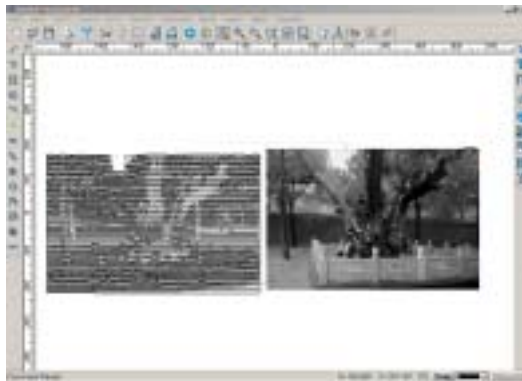


Fig. 9-18

9.1.7 Threshold

Import an image, and then click on **File->Image Processing->Threshold** in the menu bar.



Fig. 9-19 a (Before Threshold)



Fig. 9-19 b (After Threshold)

9.1.8 Despeckle

You can clean out spots on the images with Despeckle.

Select the image, and then click on File->Image Processing->Despeckle in the menu bar.

9.1.9 Invert

You can invert the color of the image by clicking File->Image Processing->Invert in the menu bar.



Fig. 9-20 a (Before inverting color)



Fig. 9-20 b (After Inverting)

9.2 Context Menu

We have mentioned this function in the chapters above, and now we are going to make a summary of it.

There are four types of functions regarding context menu: selection, node edit, text edit and 3D view.

Selection: The functions in selection include text edit, node edit, group, ungroup, filled display, delete, hide, lock/unlock, and object properties. When no objects are selected, the context menu displayed is shown in Fig. 9-21; when an object or more are selected, the context menu displayed is shown in Fig. 9-22. The last two operations are automatically memorized by the system.

Import File	
Image Stripping	
Text Tools	Ctrl+T
Node Tools	Ctrl+K
Group	Ctrl+G
Ungroup	Ctrl+U
Filled Display	
Delete(D)	Delete
Show Object	
Hide Object	
Lock/Unlock	
Object Properties	

Fig. 9-21

Circle	
Import File	
Text Tools	Ctrl+T
Node Tools	Ctrl+K
Group	Ctrl+G
Ungroup	Ctrl+U
Filled Display	
Delete(D)	Delete
Show Object	
Hide Object	
Lock/Unlock	
Object Properties	

Fig. 9-22

Node Edit: The functions in node edit context menu include add (a node), delete (a node), smooth, align, symmetry, convert to curve, convert to line, connect, disconnect, close, start point, auto remove points, fillet, chamfer, and vertical.

Click the right mouse button after selecting the curve. Select **node tools** command in the context menu, and then select the nodes to be edited, and finally click the right mouse button. Then the functions mentioned above in node editing are displayed. (Fig. 9-23)

Quit	Esc
Add	
Delete	
Break	
Join	
Close	
Convert to Line	
Convert to Curve	
Cusping	
Smooth	
Symmerty	
Nodes Align	
Start Point	
Auto Remove Points	
Fillet	
Chamfer	
Vertical	

Fig. 9-23

Text Edit: The functions in text edit context menu include rapid input, serial number text, and filled display. (Fig. 9-24)

Quit	Esc
Rapid Input(E)	
Serial Number Text(S)	
Filled Display	

Fig. 9-24

3D View: 3D view context menu is as follows. (Fig. 9-25)

Quit	Esc
Zoom In	PageUp
Zoom Out	PageDown
Zoom Window	F6
Fit to All	F7
Fit to Page	F8
Dynamic Zoom	F9
Move View	F10
Front View	
Left View	
Top View	
ISO View	

Fig. 9-25

REMARK: These functions can be enabled by clicking shortcut keys.

9.3 Layer Edit

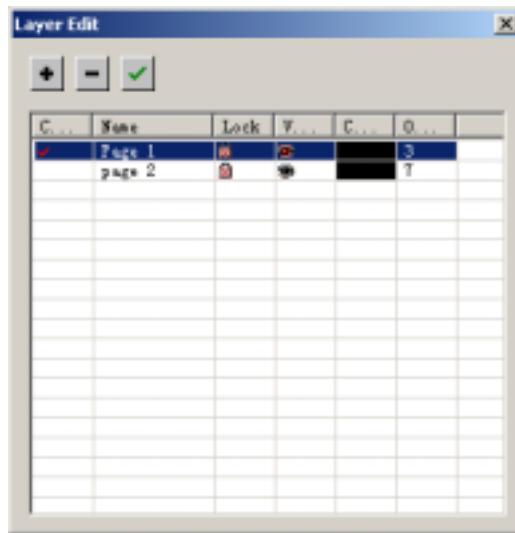
In UCanCAM, you can create shapes on different layers. You can add or delete layers so to perform operations on many objects at the same time, while none of the operations interfere with each other.

The functions of the layers are as below.

1. You can hide or show the layer as you desire.
2. You can do modifications on shapes in one layer, while the shapes in other layers are not modified.
3. You can set the color to be the same in one layer, and make shapes without the need to change the color.
4. You can name one layer so that you can find the layer easily when you need.



Layer Edit Tool Bar



LAYER EDIT DIALOG

CHAPTER TEN TOOL PATH

Engraving is to carve characters or graphs on such materials as two-color board, metal, wood, and stone. CNC machine controls the motion of X, Y and Z axis under the instruction of the computer, and drives high-speed tool or laser gun to move on the material, achieving the desired result.

After designing an artwork, the artwork's tool paths are calculated by ToolPath functions in Ucamcam V8. The data of the tool path is then sent to the control box for machining.

Various types of machining are provided by Ucamcam V8 software, including profile machining, area clearance, 3D engraving, midline machining, drilling, inlay machining, prism machining, intelligent machining, embossing machining, image dot machining, image relief machining, etc.

10.1 General Knowledge About Tools

Proper tools should be chosen when machining different materials with various rigidities in order to achieve the desired result and not to break tools. You can select the tools in the tool library.


Click on the shortcut icon  on Tool Path Bar or click Toolpath->Tool management on the menu bar and the following dialog is displayed. (Fig. 10-1)



Fig. 10-1

Tools commonly used in Ucamcam V8 include end mill, ball nose and conical. New tools can be added and existing tools can be deleted or edited in the tool library.

10.1.1 End Mill

Parameters of end mill include diameter of blade (D) and height of blade (H).



Fig. 10-2 (End mill)

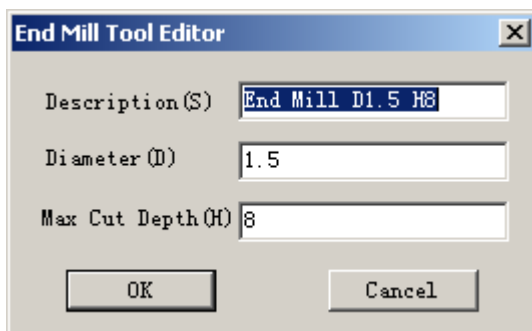


Fig. 10-3 (tool edit)

10.1.2 Ball Nose

The parameters of ball nose include diameter of blade (D) and height of blade (H).

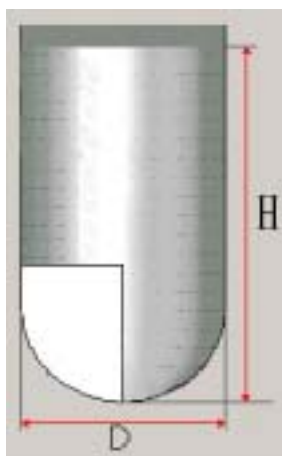


Fig. 10-4 (Ball nose)

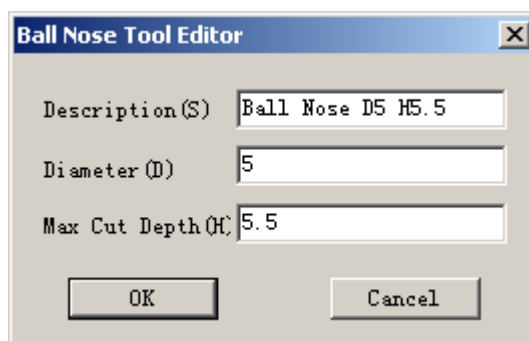


Fig. 10-5

10.1.3 Conical

Conical parameters include: diameter of handle (D1), diameter of blade (D2), height of blade (H) and angle (A) (half angle) (Fig. 10-7)

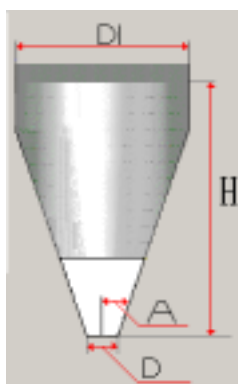


Fig. 10-6

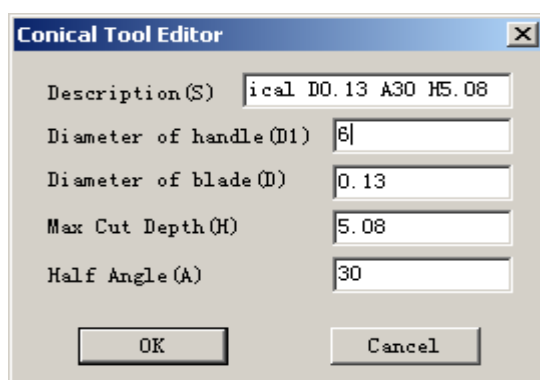


Fig. 10-7

10.1.4 Tool Editing

To add a tool

1. Select ball nose from Tool Type (The selected tool is in blue). (Fig. 10-8)
2. Then click Add.
3. A dialog is shown for you to set the parameters of the new tool. (Fig. 10-9)
4. Input the parameters of the tool in the dialog and click on **OK**.

Then the newly added tool is displayed in the tool library. (Fig. 10-10)

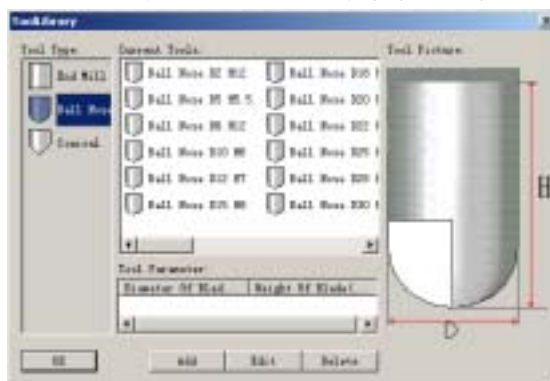


Fig. 10-8

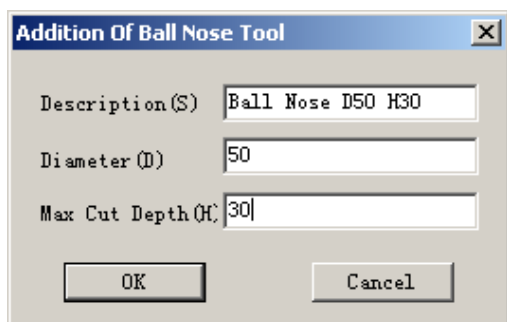


Fig. 10-9

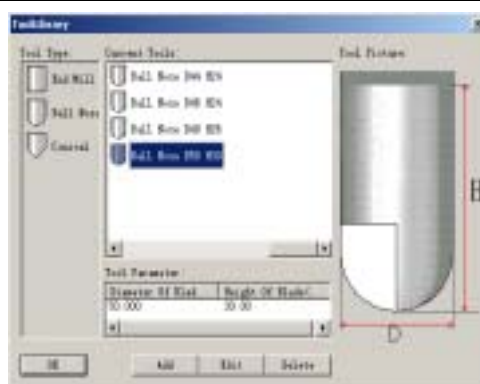


Fig. 10-10

To edit a tool

1. Select a tool in the **Current Tools** box.
2. Click on **Edit** button and a dialog **Tool Editor** is displayed.
3. Set the parameters and click on **OK**.

To delete a tool

This function is rarely used, but when you need to delete a tool from **Tool Library**, you should select a tool in **Current Tools** box and click on **Delete** button in the **Tool Library** dialog. Then the tool is deleted from the tool library.

After introduction of the tools, we can start work now. Machining can be classified into profile machining, area clearance, 3D engraving, midline machining, drilling, insert and inlay machining, prism machining, intelligent machining, embossing machining, image dot machining, image relief machining, etc

10.2 Profile Machining

Profile machining can be classified into **on side**, **outside** and **inside** according to relationships between the tool center axis and the drawing.

On side : The tool center axis is along the original drawing.

Outside: Cut along the outer contour of the drawing.

Inside: Cut along the inner contour of the drawing.

10.2.1 Parameters In Profile Machining


Click the icon  on the **Tool Path Bar** or select **ToolPath->Profile machining** on the menu bar. The **Profile machining** dialog is displayed. (Fig.10-11) You can set machining parameters in the dialog.



Fig. 10-11

Parameters include:

Tool library: You can choose a tool from the drop-down tools list or choose one from Tool Library dialog.

Cut position: on side, outside and inside.

Bridge: In order to prevent the machined object from moving which may cause objects to be destroyed or machining errors, the machined object had better not be completely separated from the material before the machining is finished. After machining, the object can be separated from the material by hand. (Fig.10-12)

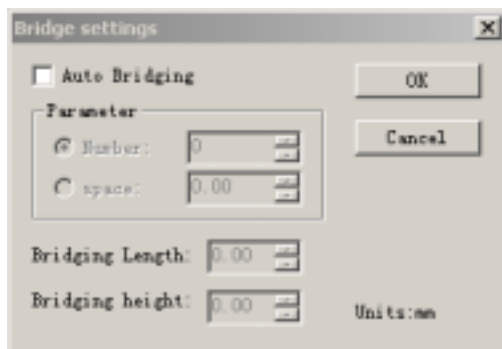


Fig. 10-12

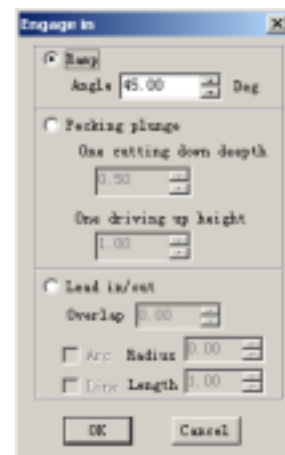


Fig. 10-13

Plunge: the tool goes into the material not in vertical direction but in slanting direction so that the tool will not be destroyed or broken because of the force during entering material. This also ensures that no mark or scar is left on the surface of the material. (Fig. 10-13)

There are 3 ways to plunge.

1. Ramp

Ramp is to plunge in a certain angle. Set the value in the dialog, and then press OK.

2. Pecking plunge

When using Pecking plunge, the tool goes into a certain depth into the material, and then goes up to a certain height, and repeat this process when cutting the material. Pecking plunge prevents the tool breaks especially when cutting hard materials.

3. Lead in / out

When using Lead in / out, the tool first goes into a certain depth outside of the material, and then cuts into the side of the material.

REMARK: Bridge and Plunge can not be activated at the same time.

Total depth: is the total depth the tool goes into the material during machining.

Priority of the shortest tool paths: is to machine in the shortest tool path, thus saving the machining time.

Multi layer: When the depth of the material is bigger than the tool height or when the material is of high rigidity (such as metal), the machining is done layer by layer on the material.

Cut direction: is the direction of the tool path, including default direction, clockwise and anti-clockwise. When choosing cutting direction, the material should be taken into consideration so that the surface of the material after being machined is smooth. Clockwise machining is fit for cutting materials of high density, such as Acryl (organic glass), brass, etc; anti-clockwise machining is fit for cutting materials of low density such as PVC board, two-color board, etc. Besides, you can also change the cut direction by clicking **Modify->Direction** on the menu bar (see Fig. 10-14). Then you can see the current cut direction. Click on the tool path, and a dialog is shown. Click on **OK** or press the **Enter** key on the keyboard to change the cut direction. (Fig. 10-16) Click the right mouse button if you do not need to preview the tool path.

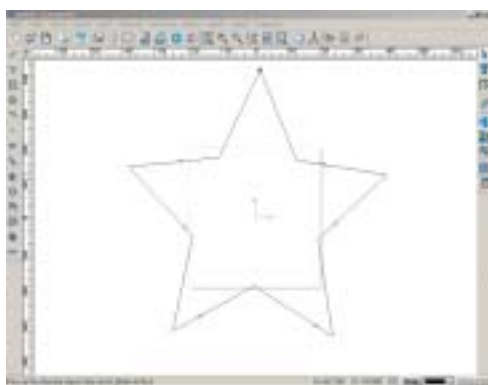


Fig. 10-14



Fig. 10-15



Fig. 10-16

10.2.2 Example

Now we are going to introduce profile machining through an example.

1. Open a new file, and draw a circle in the drawing window. (Fig. 10-17)

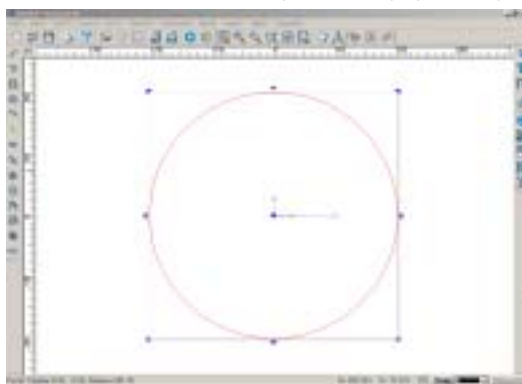



Fig. 10-17

2. Select the circle, and click on the shortcut icon  on Tool Path Bar or click Tool path->Profile machining on the menu bar. Then the dialog shown in Fig. 10-11 is displayed.

3. Select an end mill with a diameter of 10 and height of blade of 22, and set the value of total depth at 10mm and choose clockwise cut direction. Then the effect is shown in Fig. 10-18.

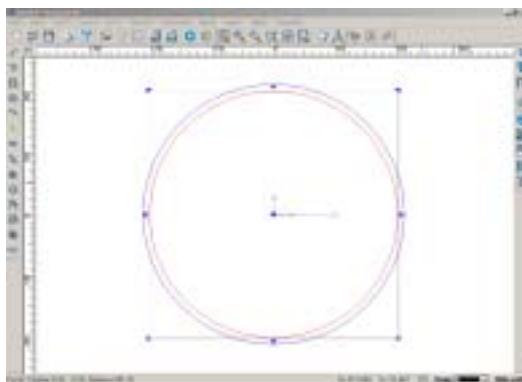


Fig. 10-18

REMARK: In profile machining, you should choose end mill or conical but not ball nose because ball nose is not fit for profile machining.

10.3 Area Clearance

Area clearance is to mill an area in the material. There are two types of milling: raster and offset. For example, we are to mill the rectangle in Fig. 10-19.

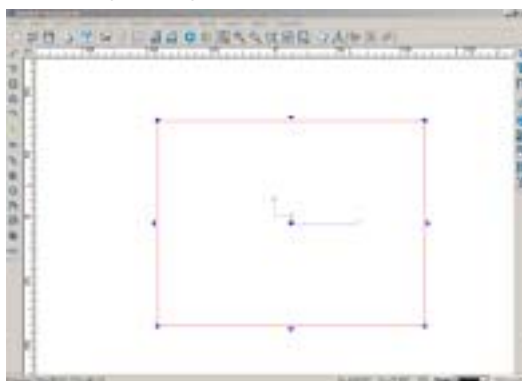



Fig. 10-19

1. Select the rectangle, then click on the shortcut icon  on Tool Path Bar or click Tool path->Area Clearance on the menu bar. Then the Area Clearance dialog is displayed.

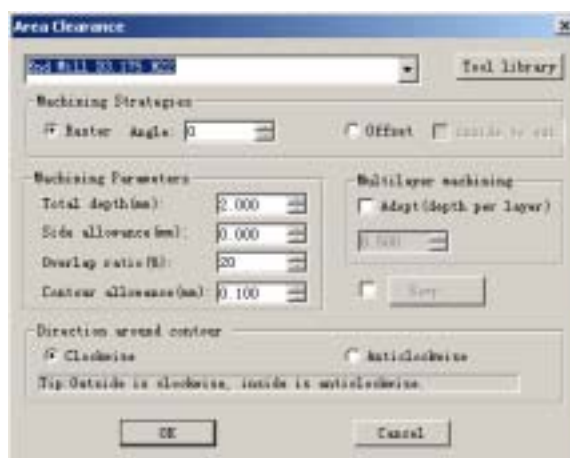


Fig. 10-20

2. Input the parameters in the dialog.

Tool Library: is for selecting a tool. You can also select a tool in the dragdown list box.

Machining strategies: is to select raster or offset area clearance. (When choosing raster, you can adjust the angle.)

Machining parameters: total depth, side allowance, overlap ratio and contour allowance.

Overlap ratio: is the ratio of the width of the tool bottom blade to the width of the last tool path.

The reason why we need to set overlap ratio is that we need to take the width of the tool into consideration during machining. If the overlap ratio is too low, then some parts of the material will not be machined; if we keep the space between tool paths as close as possible, then the surface of the material after machining will be smooth. However, if the overlap ratio is too high, then the machining efficiency will be reduced.

Next we are to introduce overlap ratio further through an example.

Fig. 10-21 is the effect with the overlapping rate of 0, and the shadowing area in Fig. 10-22 is the overlapped part of the tool.



Fig. 10-21

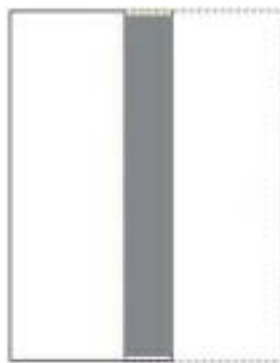


Fig. 10-22

Note: Ball nose tool should not be used in area clearance. Fig. 10-23 shows the result if ball nose tool is used in area clearance or milling. (The area in black is the part which is not machined.)

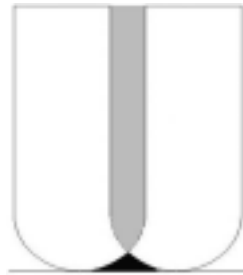


Fig. 10-23

Side allowance: is the area outside the tool path. Precision cutting can be achieved through setting side allowance.

Contour allowance: is the distance between the milling tool path and the profile machining tool path.

Direction around contour: This is to make the surface of the material smooth after being machined.

Ramp: When we do area clearance, we usually use mill cutters, and mill cutters are too fragile to cut if we use it to cut into the material at right angle. With ramp function, the cutter breaks can be well prevented because the tool goes into the material in a certain angle.

3. If we choose the end mill with a diameter of 20 and height of 10, set the angle at 0, the total depth at 2mm, overlap ratio of 50%, clockwise machining, then the effect is shown in Fig. 10-24. If we choose offset, the effect is shown in Fig. 10-25.

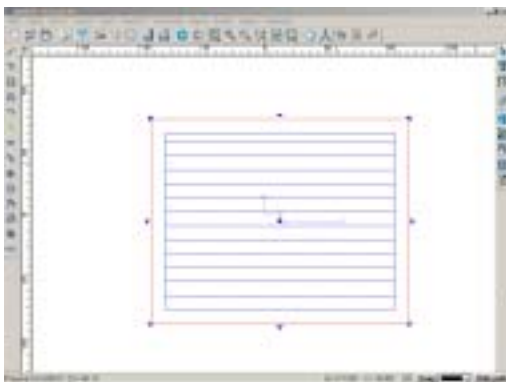


Fig. 10-24

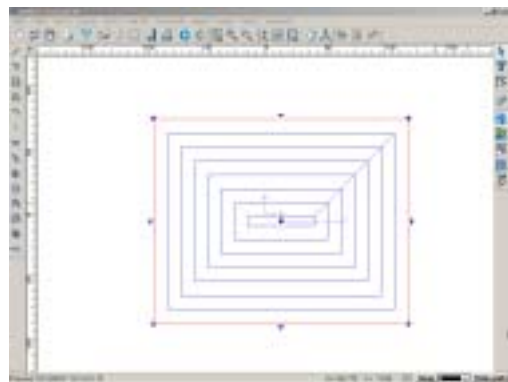


Fig. 10-25

10.4 3D Engraving

3D engraving is to make the material surface smooth and to ensure the definition, precision and third dimension effect of the machined object. It is mainly used in seal engraving and engraving of characters with special effects.

3D engraving includes top and bottom engraving, and the difference between them is the size of the machining area.

Next we are going to see an example.

1. Input text "UCA" and draw a rectangle around it in the drawing window. (Fig. 10-26)

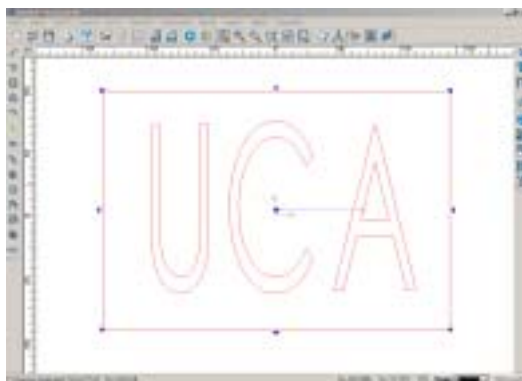


Fig. 10-26


2. Select the text and the rectangle, and then click on the shortcut icon  on Tool Path Bar or click Tool path->3D engraving on the menu bar, then the 3D Engraving dialog is displayed. (Fig. 10-27)



Fig. 10-27

3. Select a conical tool in the tool library with a diameter of 0.2, height of 10, angle of 30 degrees, and select top in machining parameters with the total depth of 5mm, overlap ratio of 60%, clockwise engraving, then the effect is shown in Fig. 10-28.



Fig. 10-28a



Fig. 10-28b

4. If we choose bottom engraving and set the other parameters the same as above, then the effect is shown in Fig. 10-29.



Fig. 10-29a



Fig. 10-29b

REMARK: You should choose a proper tool in 3D engraving. If the diameter and angle of the tool are too large, then the tool can not go into some tool paths, resulting in imperfect effect.

10.5 Midline Machining

Midline machining is to machine along the middle axis of the drawing, and there are three types of midline machining: 2D machining, 3D engraving and 3D cone. The cut depth in 2D machining is fixed, and the material is cut along its midline and during 3D engraving the cut depth is automatically adjusted according to the shape of the object and the tool used. During 3D cone engraving, the cut depth is also automatically adjusted according to the shape of the object and the tool.

Reverse machining is to machine along the original tool path in the reverse direction again after first-time machining in order to make the surface of the material smooth.

For example, machine the two letters "OP".

1. Input the two letters in the drawing window.

2. Select the two letters and click on the shortcut icon  in Tool Path Bar or click Tool

path->Midline machining in the menu bar, then a dialog is displayed. (Fig. 10-30)



Fig. 10-30

3. Select a conical tool with a diameter of 0.3, height of 10 and angle of 45 degrees, total depth of 6, and select reverse machining, 3D. Then the effect is shown in Fig. 10-31.

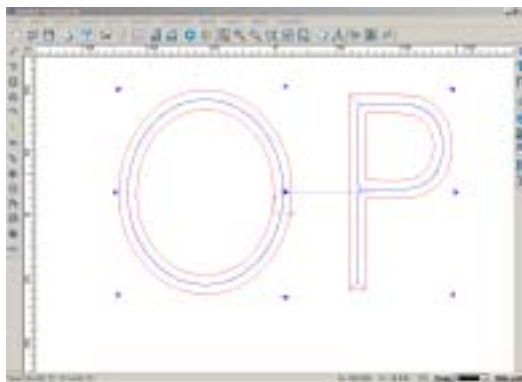


Fig. 10-31

10.6 Simple Drilling

Before drilling, You set the hole depth, space between holes and machine type parameters.

E.g.1: to drill the shape shown in Fig. 10-32.



Fig. 10-32


1. Select the object, then click on the shortcut icon  in Tool Path Bar or click tool path->simple drilling in the menu bar. Then the Simple Drilling dialog in Fig. 10-33 is displayed.



Fig. 10-33

2. Select an end mill tool with diameter of 22 and height of 10, set the total depth at 5, and select on curves, then the effect is shown in Fig. 10-34.

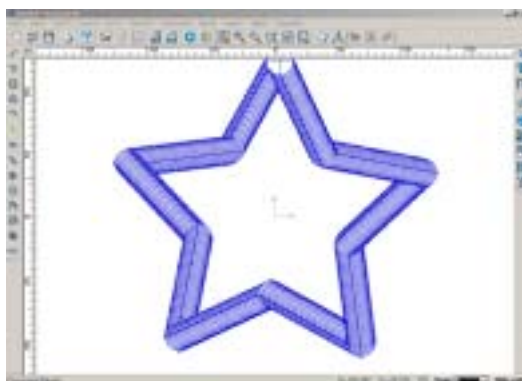



Fig. 10-34

E.g.2: to drill points

1. Draw a point and duplicate it. (Fig. 10-35)



Fig. 10-35

2. Select all the points, and click on the shortcut icon  or click tool path->simple drilling in the menu bar. Then a dialog is shown. (Fig. 10-3) Select an end mill tool with a diameter of 3 and height of 12, set the total depth at 10, and select On Points. The result is shown in Fig. 10-36.

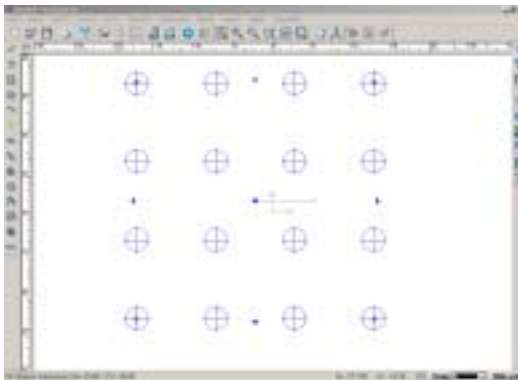


Fig. 10-36

10.7 Region Drilling

Region drilling is to drill in the inner region of the object.

Now we are to drill the region in Fig. 10-37.

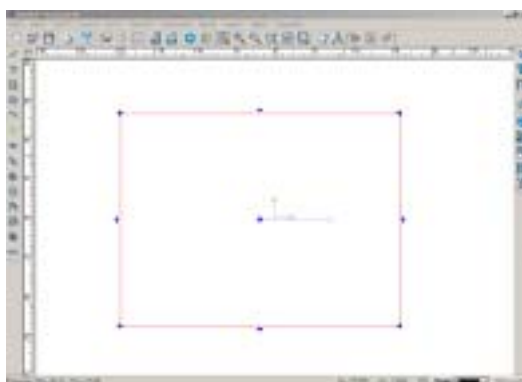


Fig. 10-37

1. Select the object, and click **tool path->region drilling** in the menu bar. Then the Region drilling dialog in F10-38 is displayed.

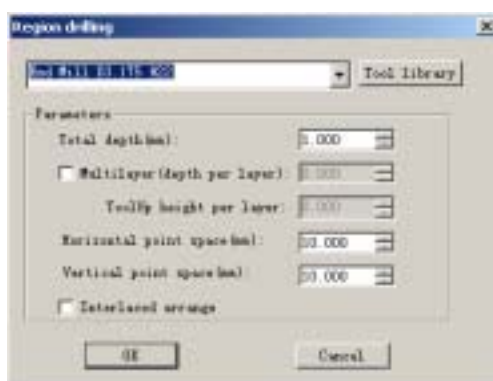


Fig. 10-38

Horizontal point space: is the distance between two points in the horizontal direction

Vertical point space: is the distance between two points in the vertical direction

Interlaced arrange: is interlaced arrangement of the points

2. Select an end mill tool with a diameter of 22, weight of 10, total depth of 6, horizontal point space and vertical point space at 44 respectively, and compare the different results when selecting interlaced arrangement and when interlaced arrangement is not selected. (Fig. 10-39)

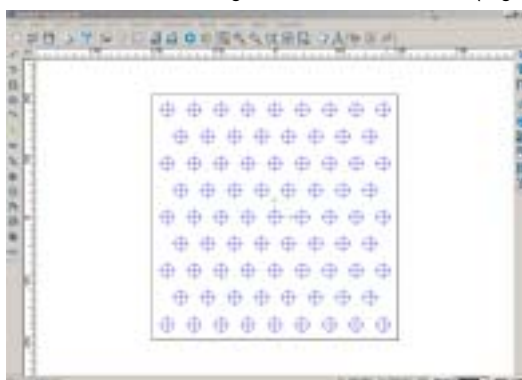


Fig. 10-39 (When interlaced arrangement is chosen)

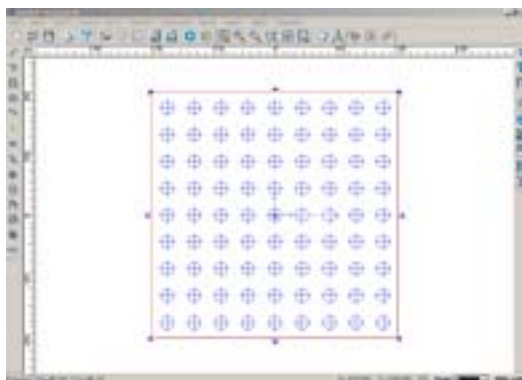


Fig. 10-39 (When interlaced arrangement is not chosen)

10.8 Insert And Inlay

Inserted and inlaid moulds are made by profile machining and area clearance.

Now we take the letter “R” as an example to introduce this function.

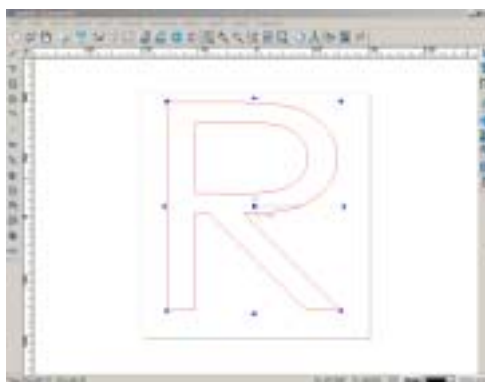



Fig. 10-40

Interspace is the distance between the inlaid mould and the inserted mould, and the value should be relatively larger when materials of high density are machined. However, it should be noted that too large value of interspacing may result in looseness. This parameter is given in both the dialog of **Inlay** and **Insert**, and you need only input the value in one of the dialog.

The following is the step.

1. Select the character “R”, and then click on the shortcut icon  in **Tool Path Bar** or click **tool path->insert and inlay->insert** in the menu bar. Then the dialog in Fig. 10-41 is displayed.

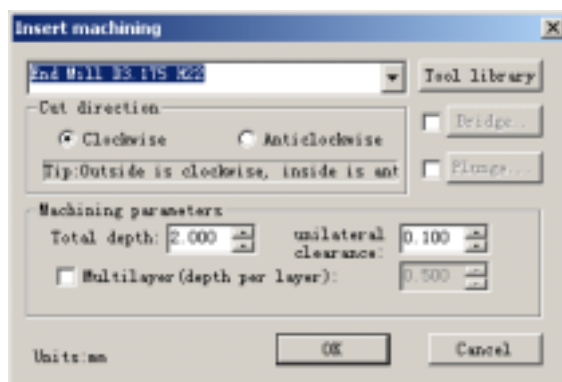


Fig. 10-41

2. Select an end mill tool with a diameter of 3.175, height of 10, total depth of 10, interspace of 0.3, anticlockwise, and the result is shown in Fig. 10-42.

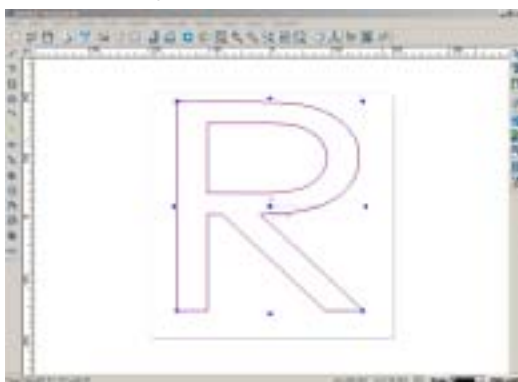


Fig. 10-42


3. Select the letter, and click on the shortcut icon  or click tool path->insert and inlay->inlay, and then the following dialog is displayed. (Fig. 10-43)



Fig. 10-43

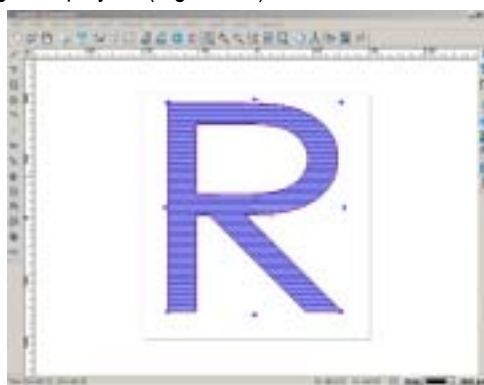


Fig. 10-44

4. Select an end mill tool with a diameter of 3.175, height of 10, total depth of 6, interspace of 0.3, anticlockwise, overlap ratio of 50, and the result is shown in Fig. 10-44.

10.9 Prism Machining

Features of prism machining in Ucamcam V8 include:

Multilayer engraving: Objects are machined layer by layer. In this way, material is saved and machining speed is improved, especially fit for machining artworks and characters with prisms.

Easy operation: Prism machining is very easy to use. Users need only draw the contours of characters with special effects, and input or adjust parameters. Then the tool path is formed.

High efficiency: The tool path is formed quickly, and if multi-layer machining is chosen, high speed and efficiency can be achieved.

Angle type: There are two kinds—rounded angle and cusp angle machining. If rounded angle machining is chosen, then the area between two bordered sides is rounded conical surface.

Next we are going to apply prism machining to the object in Fig. 10-45.

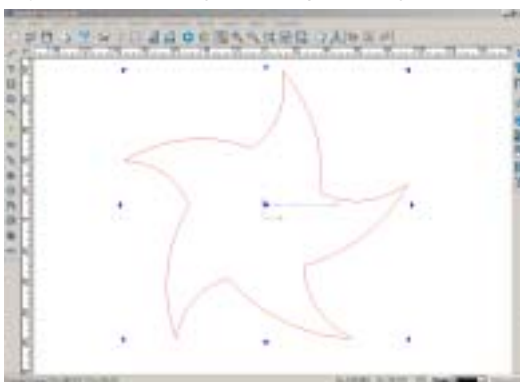



Fig. 10-45

1. Select the object, then click on the shortcut icon  in Tool Path Bar or click tool path->prism machining in the menu bar. Then the Prism machining dialog in Fig. 10-46 is displayed.

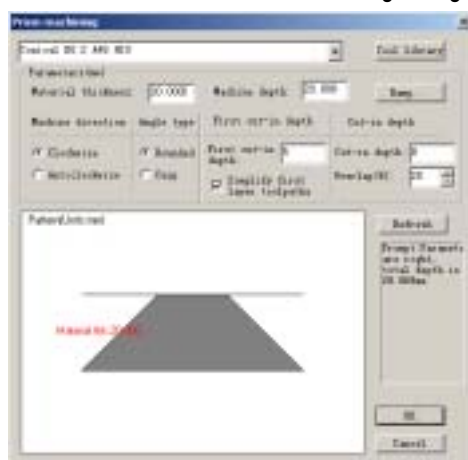


Fig. 10-46

2. Set the parameters in the dialog.

Tool : This Prism machining effect is only gotten by using the conical tool. Thus, only conical tools are provided in the tool library.

Parameters: You can set the material thickness and machining depth in this section.

Angle type: includes rounded and cusp angles.

Preview window: Prism section created is previewed in this window.

Prompt: It automatically prompts you whether you have chosen a proper tool, and also lets you know if the cutting depth is right or not.

The system automatically tells users whether the tools or defined depth of each layer is fit for machining.

3. Select a conical tool with a diameter of 0.3, height of 10, angle of 45 degrees, material thickness of 10, machining depth of 39.19, layer depth of 10mm, anticlockwise machining, and the effect is shown in Fig. 10-47. Machining depth, layer and angle vary according to the tools selected.

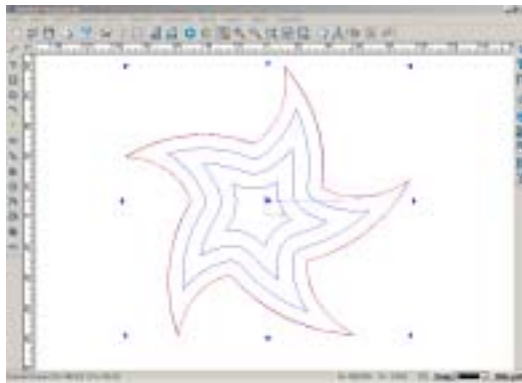


Fig. 10-47

10.10 Intelligent Machining

Efficiency in milling can be greatly improved when applying intelligent machining. Two tools can be chosen at the same time, and the tool with larger diameter will be chosen for milling for the first time, then the tool with smaller diameter will be used in milling for the second time so that the smaller areas which are not milled in the first round of milling by the larger tool can be milled. By using the tool with larger diameters, the machining speed is greatly improved, and by using the tool with smaller diameters, accurate machining is achieved.

Take the object in Fig. 10-48 for example.

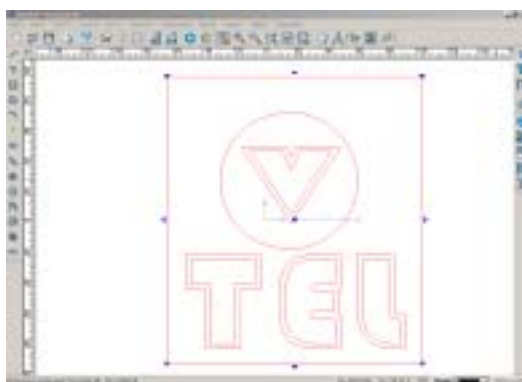


Fig. 10-48


1. Select the object, and then click on the shortcut icon  in Tool Path Bar or click Tool path->Intelligent machining in the menu bar. Then the Intelligent machine dialog is displayed(F10-49).



Fig. 10-49

2. Set the parameters in Fig. 10-49.
3. Select two end mill tools with diameter of 3.175 and 22 respectively, total depth of 3mm, overlap of 90%, anticlockwise. Then the effect is shown in Fig. 10-50.

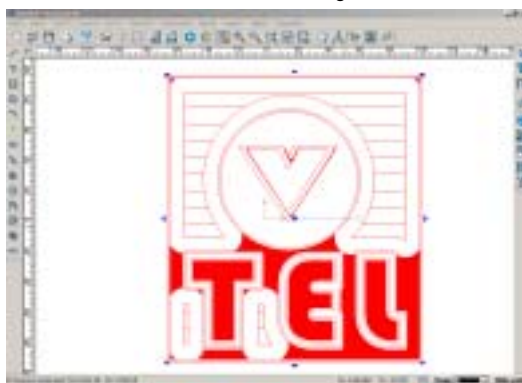


Fig. 10-50

The area with dense lines is the tool path of the smaller tool with a diameter of 3.175, and the other area is the tool path of the tool with a diameter of 22.

10.11 Embossing Machining

Embossing machining is mainly used in making rounded characters or shapes.

There are two types in embossing machining: intaglio machining and rilievo. The operation of embossing machining is quite easy, and it is widely used in such fields as embossment sign boards, breast cards, furniture, metallic moulds, printing, etc.

Take the object in Fig. 10-51 as an example.

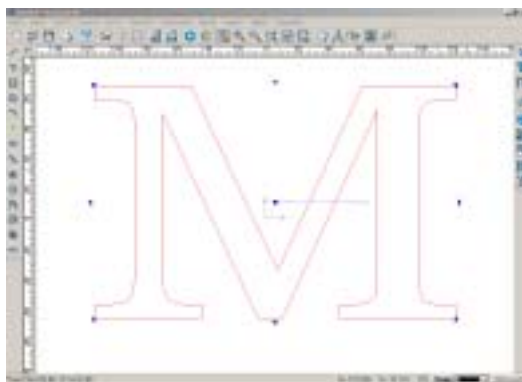



Fig. 10-51

1. Select the object, and click on the shortcut icon  in Tool Path Bar or click Tool path->Embossing machining in the menu bar. Then the dialog in Fig. 10-52 is displayed.

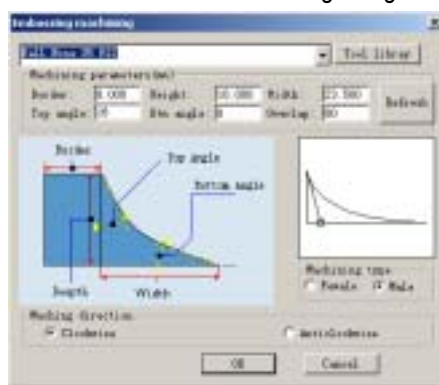


Fig. 10-52

2. Set the parameters in the Embossing machining dialog .

Machining parameters include:

Border: is the distance between the border of the contour and the tool path

Height: is the total machining depth

Width: is the width of the tool path

Top angle: is the angle formed by the vertical direction and the tool when it is entering the

material

Bot angle: is the angle formed by the horizontal direction and the tool when it is entering the material

Machining type: includes female and male machining.

3. Select a ball nose tool with a diameter of 6, height of 12, border of 0, machining height of 6, width of the default value 14.762, top angle of 0, bot angle of 0, overlap of 80%, anticlockwise, then the effect is shown in Fig. 10-53.

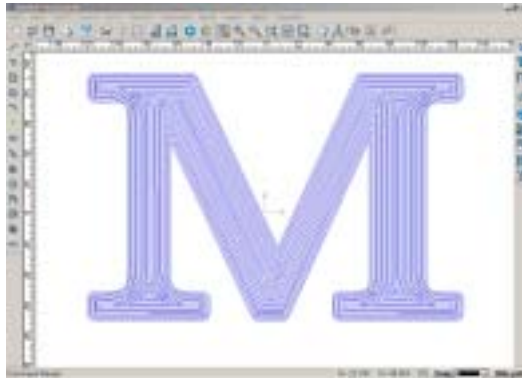


Fig. 10-53

Fig. 10-54 is 3D view of the tool path.



Fig. 10-54

10.12 Image AM/FM Machining

Image AM/FM machining is to engrave the object after the image is converted into grayscale image.

AM machining is to make the distance between the dots the same while the depth of the dots are different.

FM machining is to make the depth of the dots the same while the distance between the dots is different.



Fig. 10-55

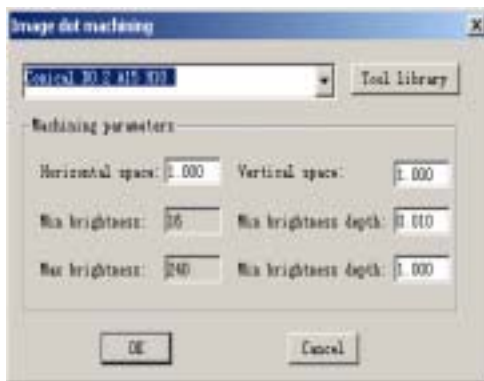


Fig. 10-56



Fig. 10-57

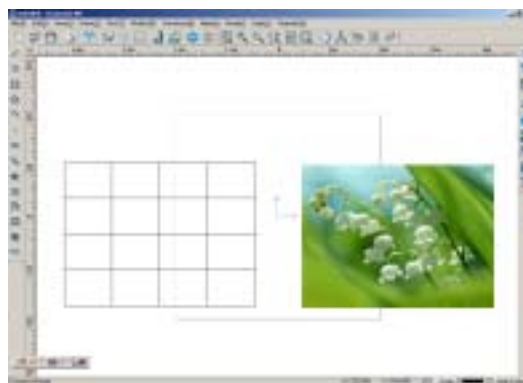


Fig. 10-58

10.13 Image Relief Machining

Image relief machining is to engrave the object after the image is converted into grayscale image. The machining is based on brightness level.

Min brightness depth and max brightness depth are the depth by which the tool goes into the

material. Horizontal/vertical machining is the direction of the tool path.

Take the image in Fig. 10-59 as an example.

1. Import a file in BMP format.

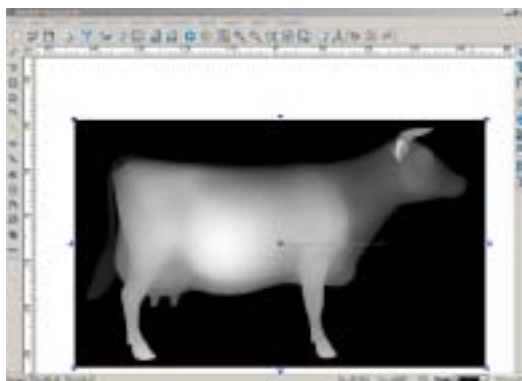


Fig. 10-59


2. Select the image, and click on the shortcut icon  in Tool Path Bar or click Tool path->Image relief machining in the menu bar. Then the dialog in Fig. 10-60 is displayed.



Fig. 10-60

3. Select a conical tool with a diameter of 0.2, blade height of 10, blade angle of 10, min brightness depth of 2, max brightness depth of 0.3, overlap of 50%, and choose horizontal machining. Then the 3D view of the effect is shown in Fig. 10-61.

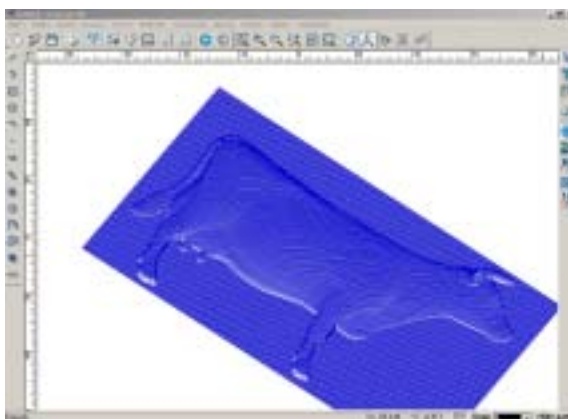


Fig. 10-61

10.14 Tool Path Sequence

Tool path sequence can be adjusted so as to improve machining process and machining quality in case the default tool path sequence is not what you want.

1. Select a tool path, and click **Tool path->Tool path sequence** in the menu bar.
2. Then the tool path is marked by numbers. (Fig. 10-62)

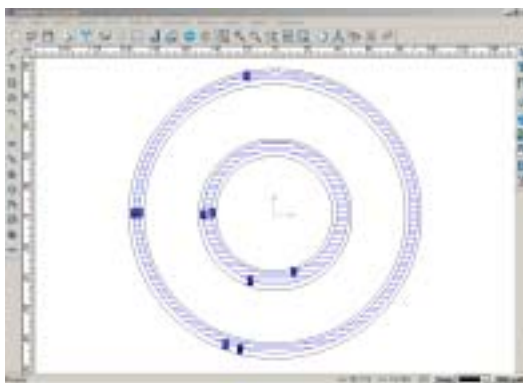


Fig. 10-62

3. Then click a sequence number to change the sequence of tool path. Or you can set the specific sequence number of a tool path unit by clicking the right mouse button on the original sequence number. The context menu displayed is shown in Fig. 10-63.
4. After setting the sequence number in the menu, click the right mouse button again, and a dialog is shown. (Fig. 10-64)
5. Click on **Yes** to save the new tool path sequence, or click on **No** to preserve the original tool path sequence. Fig. 10-65 is the new tool path.

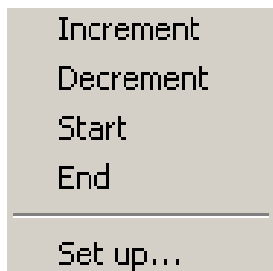


Fig. 10-63

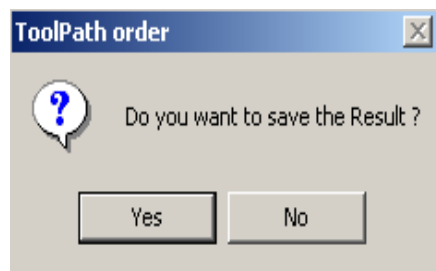


Fig. 10-64

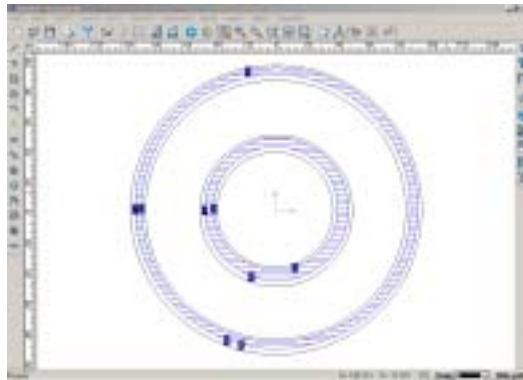


Fig. 10-65

10.15 Tool path edit

We can change the shape of the tool path by Tool path edit function. We can add, delete or move nodes of the tool path, or set the starting point. We can also reverse tool path direction. Other functions include bridge, arc fit, and feed.

Click **Tool path** -> **Tool path edit** on the menu bar, and then a dialog is displayed.

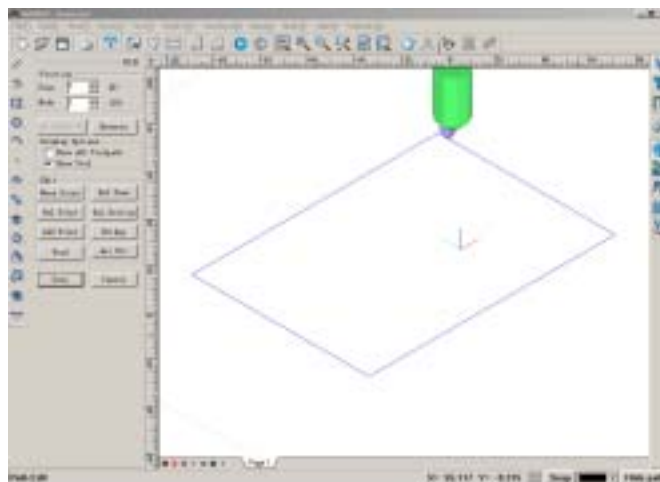


Fig 10-66

Functions available in Tool path edit include:

Pass: You can select different parts of the tool path by adjusting serial number.

Node: You can select different nodes of the tool path by changing serial number.

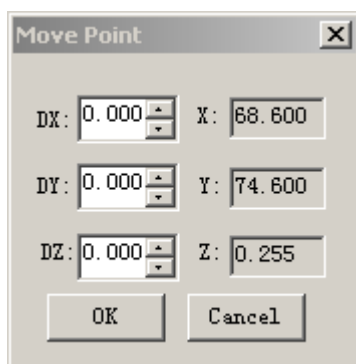
Set start point: You can set any point as the starting point of the tool path.

Reverse: is to reverse the direction of the tool path.

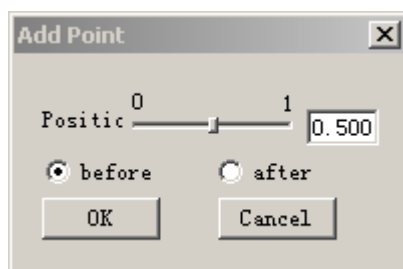
Show all tool path: Check this box, and you can see all tool paths.

Show Tool: The tool is displayed after you check this box.

Move point: You can move a node to a new position or change the shape of the tool path by changing the coordinates of the tool path.



10-67



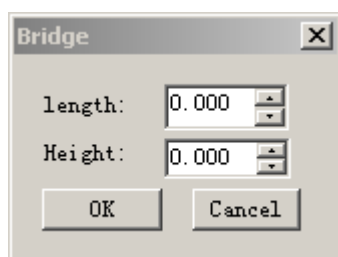
10-68

Add point: You can add nodes in a certain position of the tool path. A dialog is displayed after pressing “Add Point”.

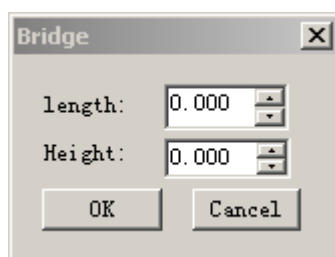
Delete point: You can delete any node on the tool path by pressing “Delete point”.

Delete section: You can delete a selected tool path section. First select the tool path, and then press “Delete section”.

Delete Pass: First select the tool path section that you want to delete, and then press “Delete Pass”.



10-69



10-70

Bridge: To prevent cutter from being destroyed or broken because of material move when job is to be finished, you can use Bridge to make the cut object not completed separated from the material. After finishing the job, you can manually take the finished product apart from the material.

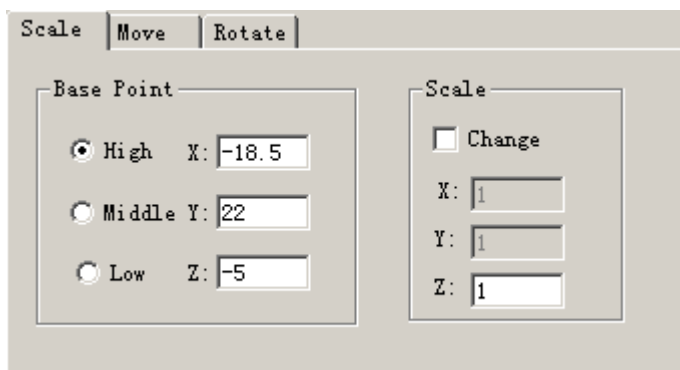
Feed: You can set spindle rpm, feed rate and plunge speed in this dialog.

Arc Fit: When it comes to tool path calculation, arcs are better than Bezier curves. By this function, a tool path is automatically changed to an arc, thus machining efficiency is greatly improved.

10.16 Tool Path Transform

With this function, you can change the size of the tool path, change the tool path position, and rotate the tool path.

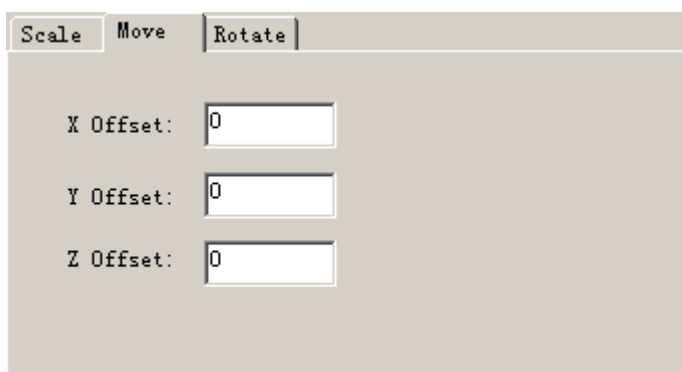
1. Scale



10-71

You can scale the tool path by clicking Tool Path -> Tool Path Transform on the menu bar. When a dialog is displayed, set the values in it, and then the tool path size is changed.

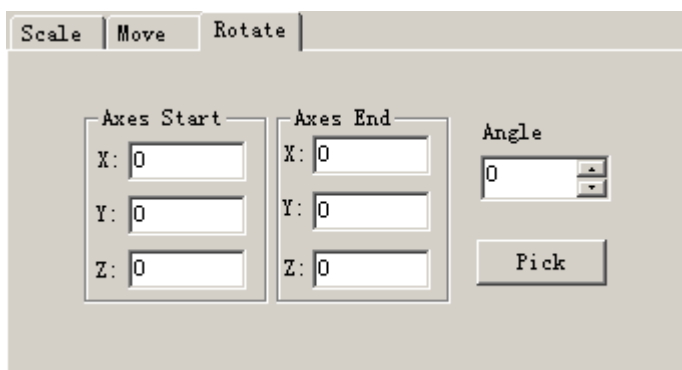
2. Move



10-72 a

You can move the tool path by clicking **Tool Path -> Tool Path Transform** on the menu bar. Set the value in the dialog, and then the tool path position is changed.

3. Rotate



10-73 b

You can also rotate the tool path by clicking **Tool Path -> Tool Path Transform** on the menu bar.

10.17 Tool Path Output

After the tool path is created, you can save it. Various file formats are provided by Ucamcam V8 software, including standard G code, contraction G code, HPGL3D, and Wentai NC.

For example, we apply area clearance and contour cutting to the object in Fig. 10-74.

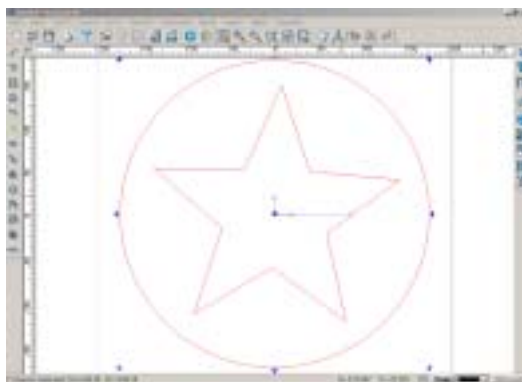


Fig. 10-74

In tool path module, select the object and apply area clearance and profile machining to it. Then the effect is shown in Fig. 10-75.

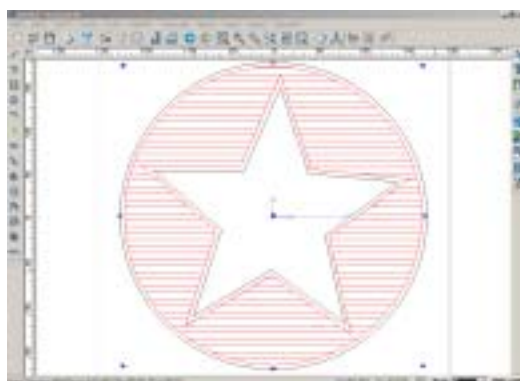


图 10-75

REMARK: When creating the tool path of several objects, it is better to hide the already-formed tool path in order to make the operation easier.


Select the tool path to be saved or click on the shortcut icon  on Tool Path Bar or click Tool path->Tool path output in the menu bar. Then the dialog in F10-76 is displayed.



Fig. 10-76

The parameters in this dialog include:

File format: includes standard G code, contraction G code, HPGL3D, and Wentai NC.

Origin point: is the origin of the tool before machining is carried out. You can select the position of the five points after “Base on feature points” or input the value of X, Y and Z to fix the position of the origin.

The location of the machining area is different according to the feature points selected. Take breast card making as an example. Fig. 10-77 shows the location of the machining area with the origin at (0, 0).

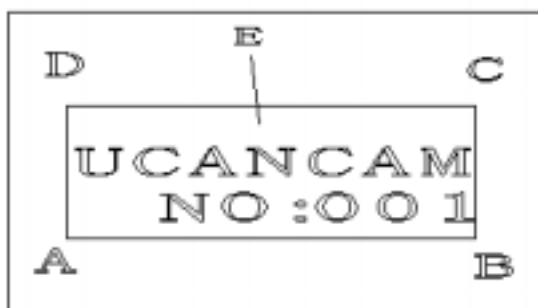


Fig10-77a

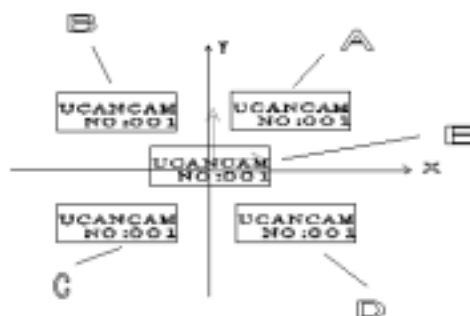


Fig. 10-77b

In order to make origin setting more flexible and the engraving more convenient, the function “Based on feature points” is available in Ucamcam V8.

Cutter lift height: is the distance between the tool position and the material surface when the tool is traveling above the material.

File name & Save: Click on “Browse” to select the tool path to be saved, name the file and then click on “Save”. Then the tool path is saved in the file you have named.

Up & Down: In case several tool paths are needed when machining an object, then you need to arrange the order of the tool path.

Delete: A tool path can be deleted if you do not need the tool path .

REMARK: A tool path can be deleted only after putting a tick before it. It can also be deleted if you select the path in the active area first before the path turns red, and then click on Delete.

The tool path list box is displayed after pressing the right mouse button. Select one tool path, and click the right mouse button. Then the menu in Fig. 10-78 is displayed. You can move up or down or delete the tool path by choosing one of the commands in the menu.

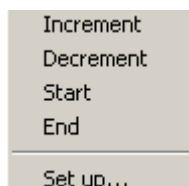


Fig. 10-78

10.18 Tool Path Walk Simulation

Machining path can be previewed through tool path walk simulation, thus avoiding trial cutting and reducing cost.

1. Select the tool path to be machined.
2. Then click on the shortcut icon  in Tool Path Bar or click Tool path->Tool path walk simulation in the menu bar. Then the dialog in Fig. 10-79 is displayed.

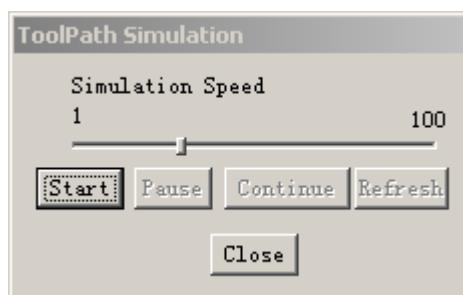


Fig.10-79

3. Adjust simulation speed and click on start to see the machining process.

In tool path walk simulation, the green frame is the path of cutting or other engraving method, and the red frame is the tool path of tool lifting. You can also stop tool path walk simulation process. Click on Refresh if you want to renew the tool path.

4. Click on Continue to resume simulation from where it stopped. (Fig. 10-80)

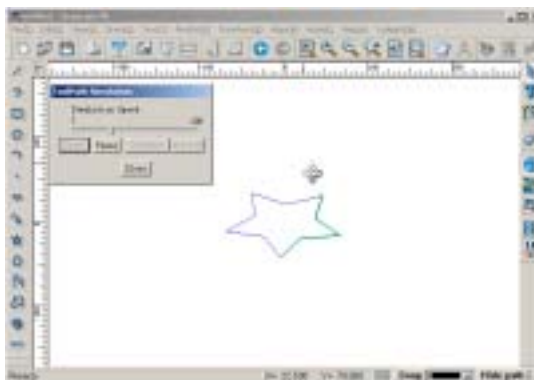


Fig. 10-80

10.19 Tool Path Shaded Simulation

Toolpath shaded simulation is to preview cutting or engraving process in realistic render mode. Simulated results can be rotated or scaled in order to be viewed from different angles.

Parameters like simulation speed, precision and stock size can be set in dialog on the left of the page; length, width, thickness, margin, machining rate, machining type, machining tool are all

displayed in the drawing window.

For example, we first apply embossing machining to the characters in Fig. 10-81. After the tool path is calculated, select the path, and then click **tool path->Tool path shaded simulation** in the menu bar. Then the dialog bar displayed on the left of the page to set the parameters. Enter the parameters, and click on **start** to see the simulation.

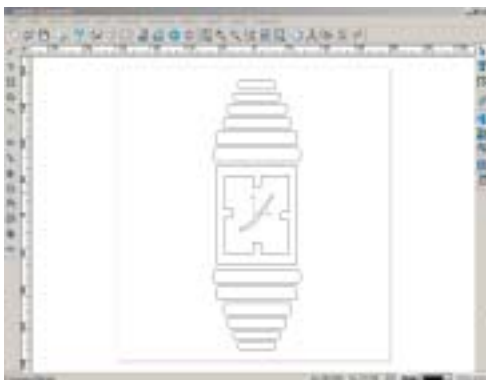


Fig. 10-81a (object)

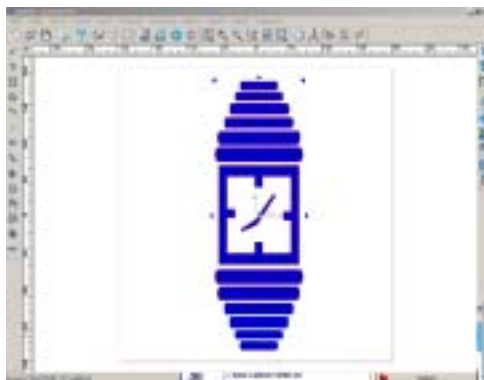


Fig. 10-81b (tool path)



Fig. 10-81 c (3D view of tool path)

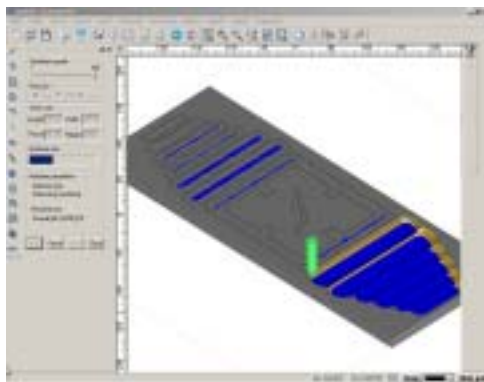


Fig. 10-81d (toolpath shaded simulation)

10.20 Tool Path Panel

Tool path panel is used to separate a tool path into several smaller portions so that you can machine materials accurately even when the work area of your machine is not big enough. After machining, you can combine the portions together to form a complete one. In this way, not only machining time is reduced, but also efficiency is improved.

To apply tool path panel to a tool path

1. Select an object.
2. Apply a tool path calculation to the object to form a tool path.
3. Click on the tool path.
4. Click **Tool Path->Tool Path Panel** in the menu bar.
5. A dialog **Toolpath Panel** is displayed.

6. Set the parameters in the dialog, and click on OK to validate the setup.
Then the tool path is separated into several parts.

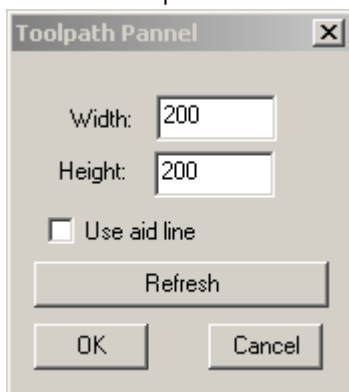


Fig. 10-82 (Dialog)

Parameters include:

Width: is the width of each independent tool path after applying tool path panel.

Height: is the height of each independent tool path after applying tool path panel.

Use aid line: is to use the guide line as the aid line to separate a tool path.

Refresh: is to reset the above parameters.

Remark: When applying Toolpath panel to a tool path, you should put the object in the drawing window (the grey rectangular box); otherwise, the function is invalid.

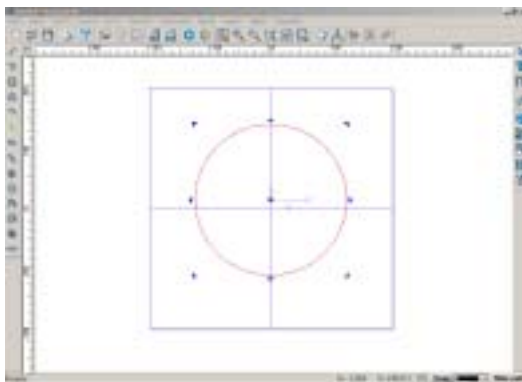


Fig. 10-83 (Tool Path Panel)

10.21 Group Toolpath

You can group several toolpaths as one unit for machining.

Create and select two or more tool paths, and then click on **Tool Path->Group Toolpath** in the menu bar. Then the tool paths are grouped together.

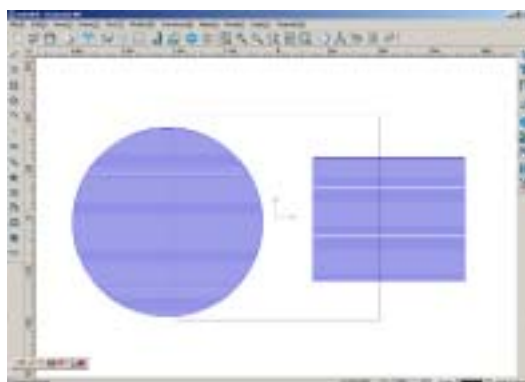


Fig. 10-84

CHAPTER ELEVEN OUTPUT

After designing an artwork, you may want to print it or output it through engraving machines. Before output of the file, we need to set external equipments so as to get accurate output result.

11.1 Print

Connect the printer with your computer before you start printing.

Next, we are going to introduce the process with HP Color LaserJet 5 as an example.

11.1.1 Printer Installation

1. Select Printers from Control Panel or click Start menu->Setting->Printer(P) command to open the Printer dialog. (Fig. 11-2)



Fig 11-1



Fig. 11-2

2. Double click on Add printer , and the dialog Add printer wizard is displayed. (Fig. 11-3)



Fig. 11-3

3. Printer parameters setting

The Print dialog is displayed after you click File->Printer command in the menu bar. (Fig. 11-4)

11.1.2 Printer Setting



Fig. 11-4

There are four parts in the dialog: **printer**, **copies**, **scale** and **position**. If there are more than one printers connected, you should choose one of them from the dragdown menu. You can set the size, origin and orientation of the paper according to your needs.

Click on **Properties** to enter the Document Properties dialog. (Fig. 11-5)

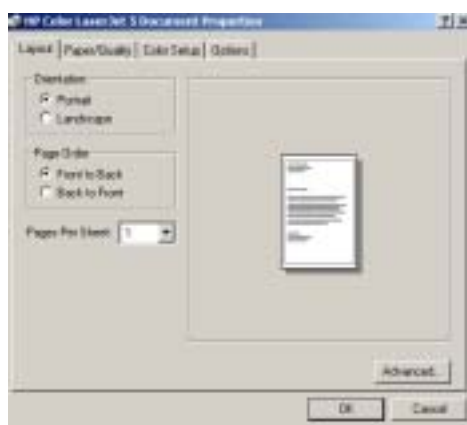


Fig. 11-5

The number of pages per sheet and two-side printing can also be set here. Click **Paper/Quality**, and click on **Advanced** to display the **Advanced options** dialog. (Fig. 11-6) The graphs, and parameters of document options, printing features are set here.



Fig. 11-6

Click on **Layout** to set orientation, page order and pages per sheet. Printing effect can be previewed through the previewing window in the right part. In most cases, the value is kept as the default value. (Fig. 11-7)



Fig. 11-7

Click on **Color setup** to set the colors of the text, graphs and photos. (See Fig. 11-8)

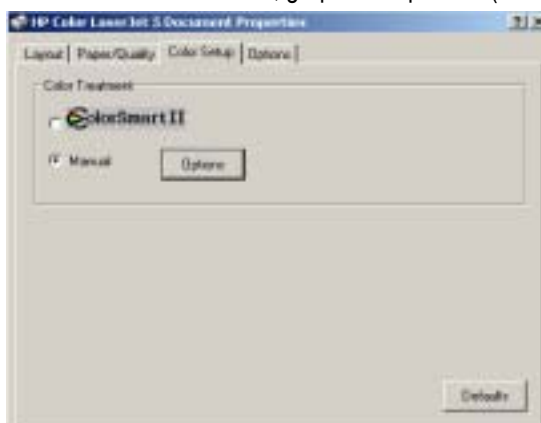


Fig.11-8


Click on **Options** to select the graphics mode. Click on  to see the information about the copyright of the printer. (See Fig. 11-10)




Fig. 11-9



Fig. 11-10

REMARK: Printer setting is different according to the brand and type of the printer used. Please refer to the instruction of your printer during setup.

11.1.3 Printing A File

The Print dialog is displayed after clicking **File->Print** command (the shortcut key is Ctrl +P), or by clicking on the shortcut icon . (Fig. 11-11)

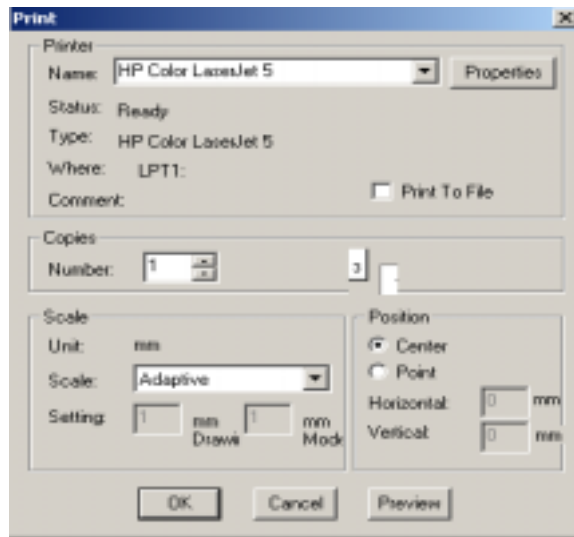


Fig. 11-11

Copy : is the number of copies of the file to be printed.

Scale : is the ratio of the size of the drawing to that of the paper. Select the value in the dragdown menu. You can also select **Setting** to set the scale you need.

Position : is the location of the page on the paper.

Click on **Properties** to enter the **Properties** dialog. (Fig. 11-12)

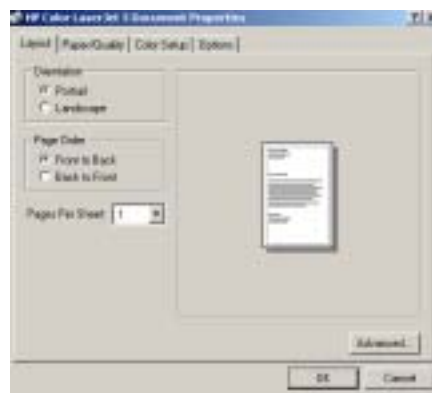


Fig. 11-12

The page can be previewed after clicking **Preview** in the **Print** dialog. (Fig. 11-13)



Fig. 11-13

The page can be viewed after being zoomed in **Previewing** module. (The page can be zoomed by four times) Click on **OK** to print the file. Click on **Cancel** or Esc key in the keyboard to exit previewing module.

Remark: The size of the page can be zoomed in by pressing the left mouse button on the page, and the page returns to normal size by pressing the left mouse button again.

CHAPTER TWELVE CASES

Several cases are given in this chapter so that users get to know the functions and operation of Ucamcam V8 better.

Case 1. Profile Machining

1. Launch Ucamcam V8 software. (Fig. 12-1)

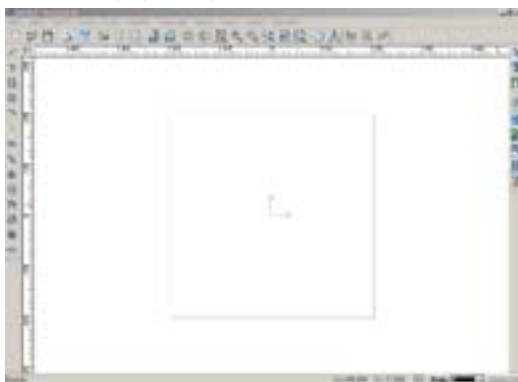



Fig. 12-1

2. Click on the shortcut icon  in **Editing Mode Bar** or click **Draw->Symbol library** command in the menu bar. Then the symbol library is displayed on the left of the drawing window. Drag a symbol into the drawing window by clicking it and holding the left mouse button. (Fig. 12-2)

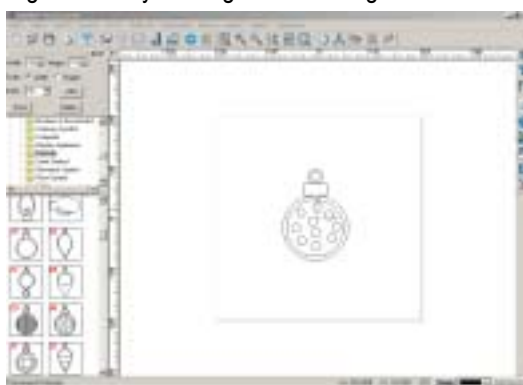



Fig. 12-2

3. Select the symbol and click on the shortcut icon  or click **Transform->Scale** command in the menu bar. Then the dialog in F12-3 is displayed. Set the parameters. The result is shown in Fig. 12-4.

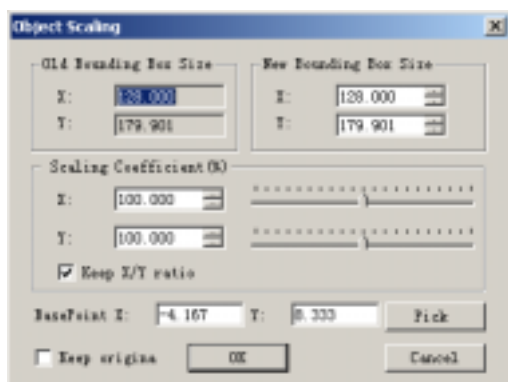


Fig. 12-3

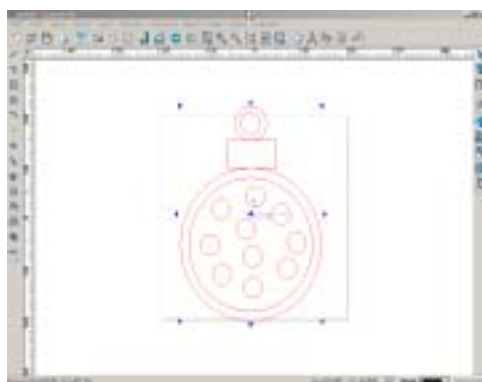


Fig. 12-4

4. Next we are going to calculate the tool path, but remember that you should consider whether the symbol is fit for the tool path chosen. For example, you need to know the relation between the diameter of the tool bit and the smallest line width of the symbol. The diameter of the tool bit should be smaller than the smallest line width. Node editing can be employed to modify the areas that tools can't go into. Fig. 12-5 and 12-6 show the effect before and after node editing.

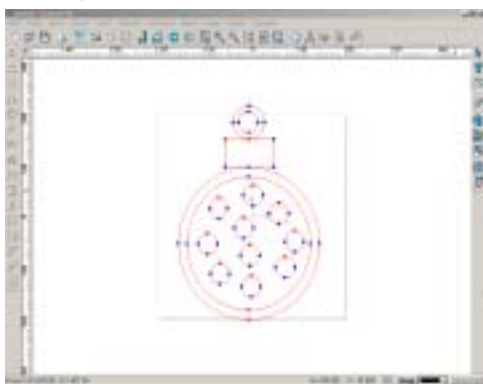
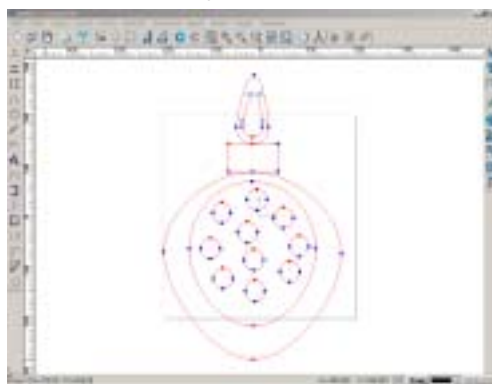


Fig. 12-5



F12-6


5. Select the symbol, and click on the shortcut icon  in Tool Path Bar or click Tool path->Profile Machining command in the menu bar. Then the dialog in Fig. 12-7 is displayed. Set the parameters. Click on OK to validate the setup and Fig. 12-8 shows the result.



Fig. 12-7

6. Save a tool path

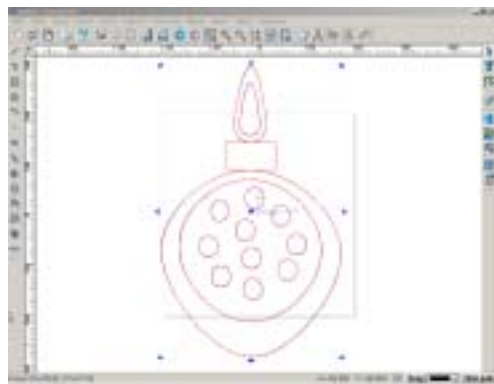



Fig. 12-8

Click on the shortcut icon  on Tool Path Bar or click Tool path->Tool path output in the menu bar. The dialog in Fig. 12-9 is shown. Click **Standard G-code** in the format box, "Point A" in "Base on feature points" box, and click on "Browse" to select a location to save the file. Name the file as 1.nc, click on Save, and then the tool path is saved in the file named "1".

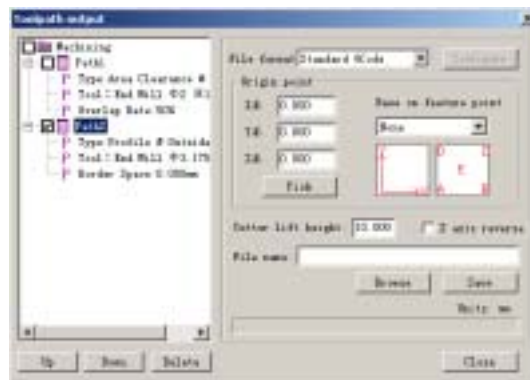

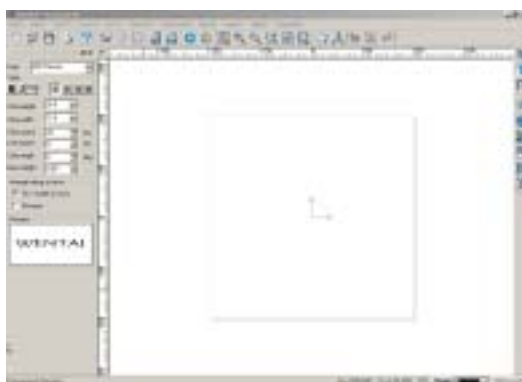


Fig. 12-9

Case 2. Area Clearance

1. Launch Ucamcam V8 software.

2. Click on the shortcut icon  in Editing Mode Bar or click Text->Text tools command in the menu bar, and then the text editing menu is shown on the left of the drawing window. (Fig. 12-10)



F12-10

3. Type the letter "M" in the drawing winow. (Fig. 12-11)

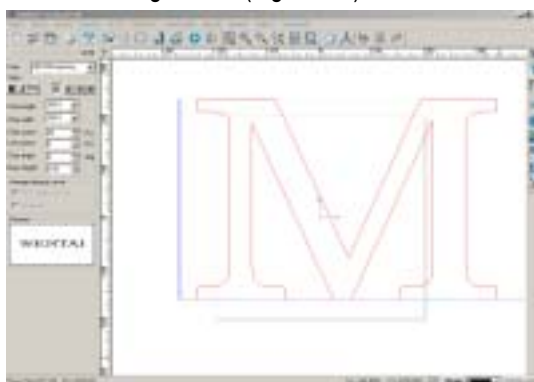


Fig. 12-11

4. Select the letter to edit it. (You should choose the font, set values of height, width, character space, line space, character angle, and base height here.) The result is shown in Fig. 12-12.

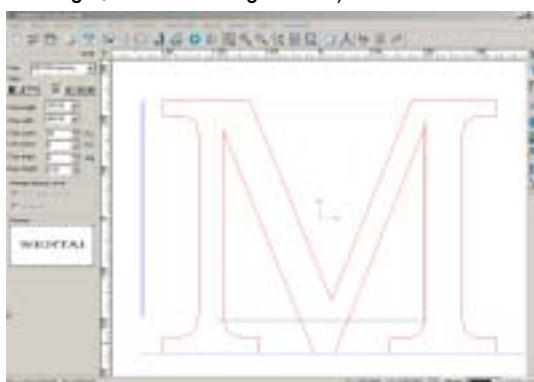




Fig. 12-12

5. Exit text editing status, and select the letter. Then click on the shortcut icon  on Transform Bar or select Transform->Scale command in the menu bar, and a dialog is shown. You can change the size of the letter.

6. Click on the shortcut icon  on Curve Bar or select Draw->rectangle->rectangle command in the menu bar to draw a rectangle around the letter. (Fig. 12-13)

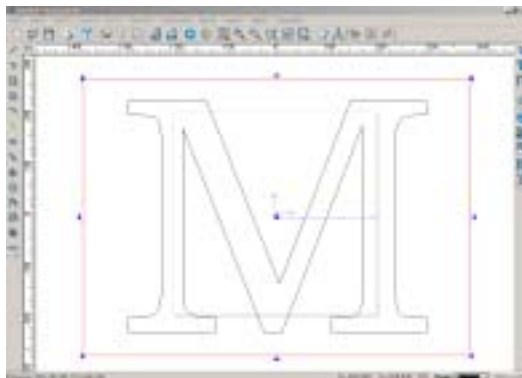



Fig. 12-13

7. Press Ctrl + A or click Shift key to select the two objects one by one, then click on the shortcut icon  on Aligning Bar or click Align->Align center command in the menu bar . The result is shown in Fig. 12-14.

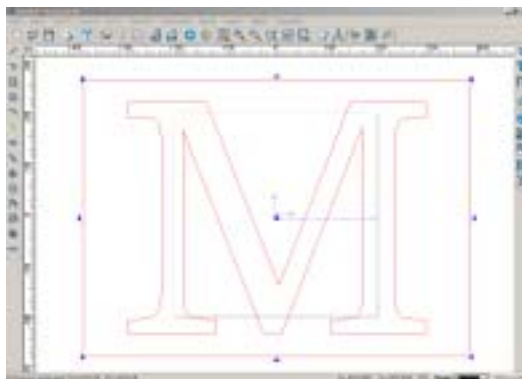



Fig. 12-14

8. Select the rectangular frame, and click on the shortcut icon  in Modification Bar or click Modify->Offset command in the menu bar. Then a dialog is shown (Fig. 12-15). Set the Offset distance at 7, choose inner direction, and the result is shown in Fig. 12-16.

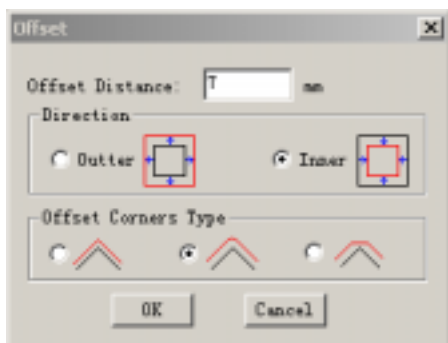


Fig. 12-15

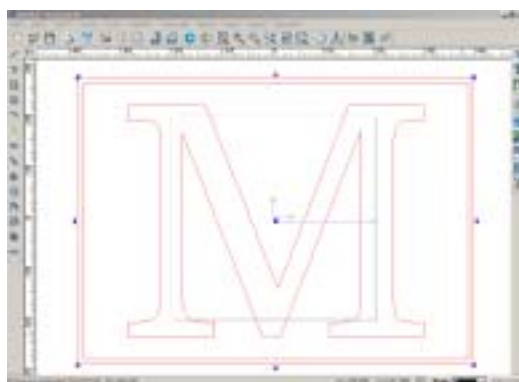


Fig. 12-16

9. Select the inner rectangle and repeat step 8 (set the offset direction at 2, and choose inner direction). The result is shown in Fig. 12-17.

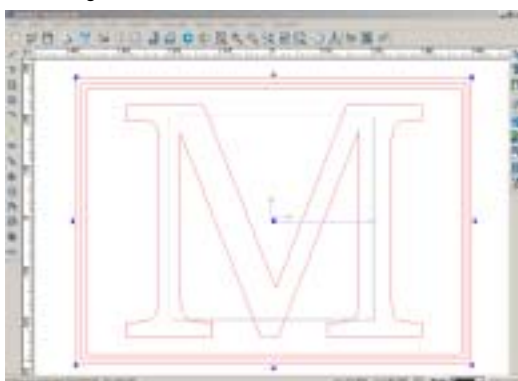


Fig. 12-17


10. Now we apply area clearance on the letter: select the letter, click on the shortcut icon  in Tool Path Bar or click Tool path->Area clearance command in the menu bar. Then the dialog is shown. (Fig. 12-18) Choose a conical tool with a diameter of 0.3, angle of 15, blade height of 10, choose raster machining strategies (0 degree), a total depth of 0.2, overlap ratio of 40, anticlockwise. The result is shown in F12-19.



Fig. 12-18




Fig. 12-19

11. Then apply area clearance on the two inner rectangles, with the parameters the same as in Step 10. (Fig. 12-20)



Fig. 12-20

12. Finally, cut the rectangle outside by profile machining. Select the outside rectangle, click on the shortcut icon  on **Tool Path Bar**, and then a dialog is displayed. Select an end mill of 3.175, total depth of 1.2 (total depth is the thickness of the material), and anticlockwise machining. The result is shown in F12-21.

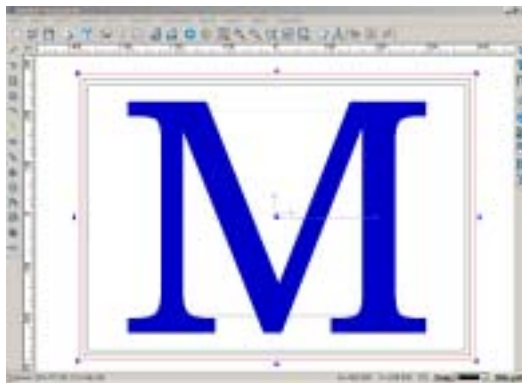


Fig. 12-21

13. Save the path: First save the tool path of profile machining of the outer rectangle with cutter lift height of 10, base on feature point A, and file name of “2.nc”; then save the tool path of area clearance, with cutter lift height at 5 and file name of “3.nc”.

In this way, you do not need to define the tool entry location when changing the tool so that the object can be output directly on the machine, thus improving machining efficiency and quality.

Case 3. 3D Engraving

3.1 Top surface machining

1. Enter Ucamcam V8 software.

2. Type the letter "M". (Fig. 12-22)

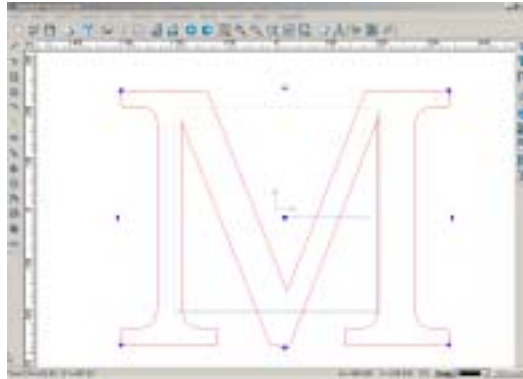


Fig. 12-22

3. Select the letter to edit it. Choose the font, character height, character width, and character space.

4. Adjust the scale of the letter.

5. Draw a rectangle around the letter, and choose align center.


6. Select the rectangle and the letter, and click on the shortcut icon  in Tool Path Bar or select Tool path->3D engraving command in the menu bar. Then a dialog is displayed. (Fig. 12-23)



Fig. 12-23

Select a conical tool with diameter of 0.2, angle of 10, and height of 10, raster machining strategy (0 degrees), total depth of 5, overlap ratio of 40, anticlockwise, and select "Top" in machining parameters. Then the result is shown in F12-24.



Fig. 12-24

7. Save the tool path: save the tool path with cutter lift height at 10, base on feature point A, and name the file 4.nc.

3.2 Bottom surface machining

The steps in bottom surface machining are the same as top surface machining.

Fig. 12-25 is the result of bottom surface machining.



Fig. 12-25

Case 4. Midline Machining

4.1 Midline machining in 2D

1. Launch Ucam V8 software.
2. Type the letter "B", and set the font, and the parameters of character height, width, space and line space. Then change the scale of the letter according to your requirement.


3. Select the letter, and click on the shortcut icon  in Tool Path Bar or select Tool path->Midline machining command in the menu bar. Then the Midline machining dialog is shown. (Fig. 12-26) Select a conical tool with diameter of 0.2, angle of 45, height of 10, 2D, set total depth at 5, and choose Reverse machining and the result is shown in Fig. 12-27.



Fig. 12-26

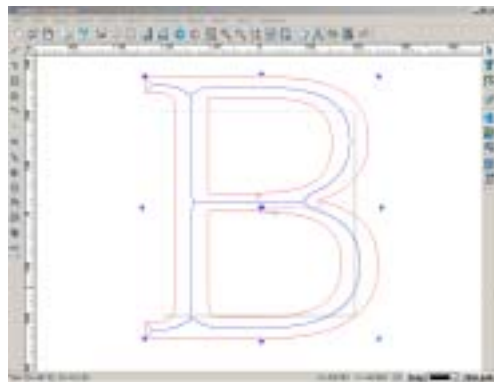


Fig. 12-27

4. Save the tool path: save the file with cutter lift height of 10, base on feature point A, and name as "file1.nc".

4.2 Midline machining in 3D

1. Launch Ucam V8 software

2. Input the letter "B", and set the font, character height, character width, line space and character space. Change the scale of the letter according to your requirements.


3. Select the letter, and click on the shortcut icon  in Tool Path Bar or select Tool path->Midline machining command in the menu bar. Then the dialog is displayed. (Fig. 12-28)



Fig. 12-28

Select a conical tool with diameter of 0.2, angle of 45 and height of 10, 3D, set total depth at 5, and select reverse machining. The result is shown in Fig. 12-29.

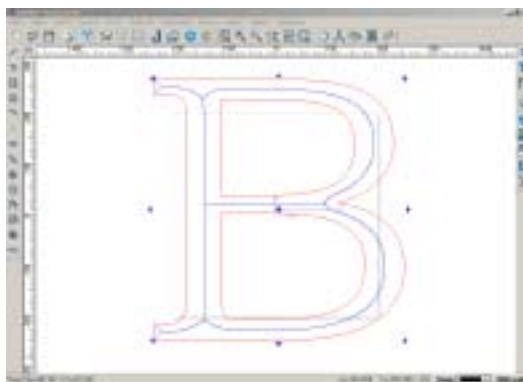


Fig. 12-29

4. Save the tool path: save the file with cutter lift height of 10, base on feature point A, and name of "file1.nc".

Case 5. Simple Drilling

1. Launch Ucamcam V8 software.
2. Draw an ellipse and a regular polygon. (Fig. 12-30)

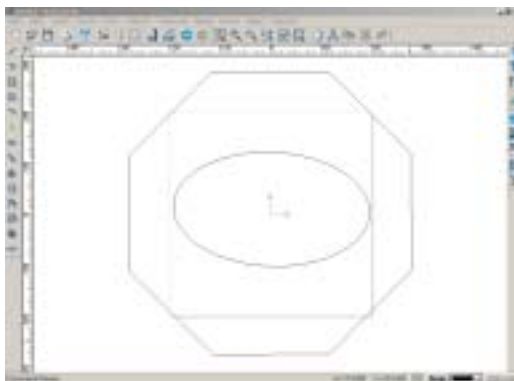



Fig. 12-30

3. Select the graph, and click on the shortcut icon  on Tool Path Bar or select Tool path->Simple drilling in the menu bar and the simple drilling dialog is shown. (Fig. 12-31)

Select an end mill tool with diameter of 22, height of 10, set total depth at 5, point space at 44, choose on curves, and the result is shown in Fig. 12-32.



Fig. 12-31

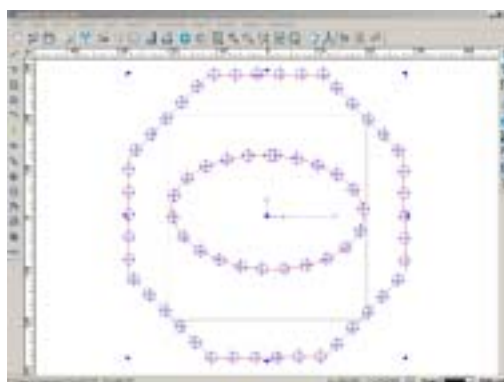


Fig. 12-32

4. Save the tool path: Save the file with cutter lift height of 10, base on feature point A, and name of "7.nc".

Case 6. Insert And Inlay

1. Launch Ucamcam V8 software.
2. Choose a symbol from the **Symbol Library**, and adjust the sizes of it if necessary. (Fig. 12-33)

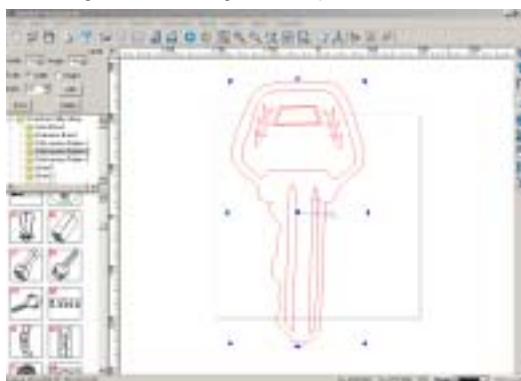



Fig. 12-33

3. Ungroup the graph, and select its outer contour. (Fig. 12-34) Click on the shortcut icon  on Tool Path Bar or select Tool path->Insert and Inlay->Insert machining in the menu bar and the dialog in Fig. 12-35 is shown.

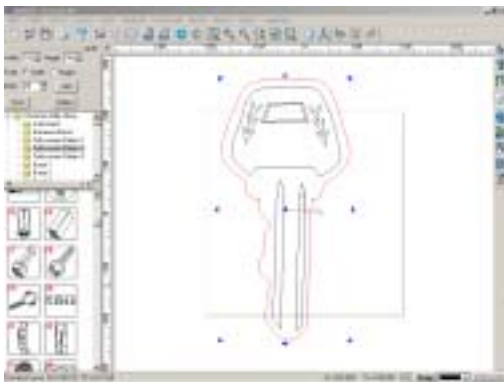


Fig. 12-34

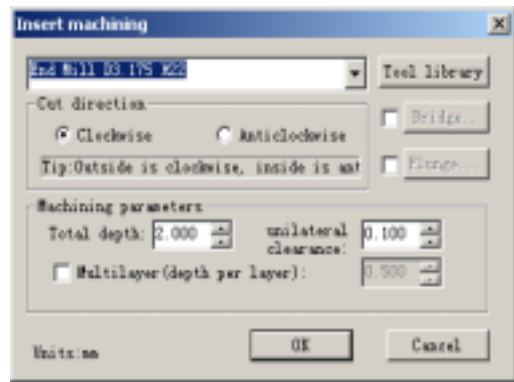


Fig. 12-35

4. Select an end mill tool with a diameter of 3.175 and height of 10, choose anticlockwise machining, set total depth at 10, interspace at 0.3, and the result is relievi. (Fig. 12-36)

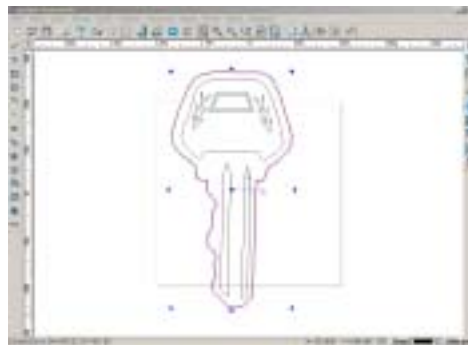

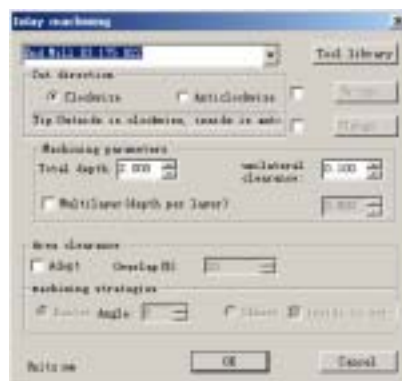
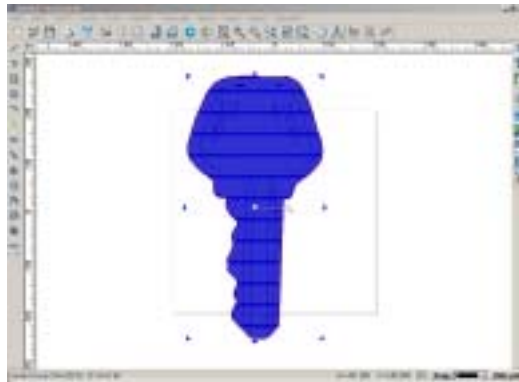


Fig. 12-36

5. Next we are going to make intaglio mould. Click on the shortcut icon  on Tool Path Bar or select Tool path->Insert and inlay->Inlay command in the menu bar. The Inlay machining dialog is shown in Fig. 12-37. Choose a tool with diameter of 3.175 and height of 10, anticlockwise machining, total depth of 10, interspace at 0, overlap ratio of 80%, area clearance, and the result is intaglio. (Fig. 12-38)



F12-37



F12-38


6. Hide the path and select the whole object. Click on the shortcut icon  on Tool Path Bar or select Tool path->Area clearance command in the menu bar and the Area clearance dialog is shown in Fig. 12-39. Select a tool with diameter of 0.2, angle of 15 degrees, height of 10, raster machining, total depth of 2, overlap ratio of 35, anticlockwise. The result is shown in Fig. 12-40.



Fig. 12-39



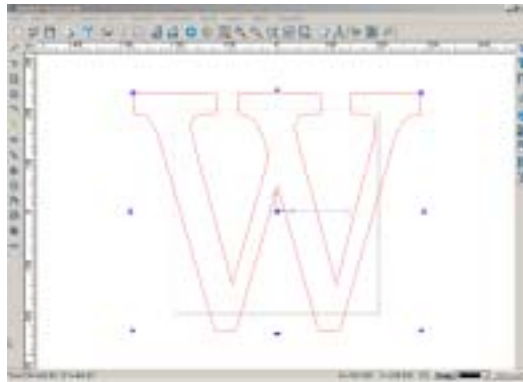
Fig. 12-40

7. Save the tool path


Save the insert tool path file with a file named file1.nc, base on point A, cutter lift height of 10, and save the intaglio tool path with a file named file2.nc, not to select the feature point, cutter lift height of 10, and save area clearance tool path with file named file3.nc, not to select the feature point and cutter lift height of 10.

Case 7. Prism Machining

1. Launch Ucamcam V8 software.
2. Type the letter "W", and adjust its size if necessary. (Fig. 12-41)



F12-41

3. Select the letter, and click on the shortcut icon  in Tool Path Bar or select Tool path->Prism machining in the menu bar. Then the Prism dialog is shown. (Fig. 12-42)

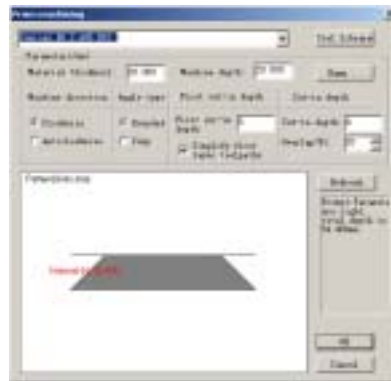


Fig. 12-42

Select a conical tool with a diameter of 0.2, height of 10 and angle of 45, material thickness of 20, first cut-in depth of 10mm, rounded angle, anticlockwise machining, and the result is shown in Fig. 12-43.



Fig. 12-43


4. Hide the tool path, and select the letter to cut the contour. Click on the shortcut icon  in Tool Path Bar, and the profile machining dialog is shown. (Fig. 12-44) Select a tool with a diameter of 3.175, height of 10, choose outside cut position, total depth of 20, anticlockwise. Click on OK, and the result is shown in Fig. 12-45.



Fig. 12-44



Fig. 12-45

5. Save the tool path: save the prism machining tool path with the file named file1.nc, base on feature point A, cutter lift height of 10, and save the tool path of profile machining with file named file2.nc, not to select the feature point and cutter lift height of 10.

Case 8. Intelligent Machining

1. Launch Ucamcam V8 software.
2. Select a symbol from the Symbol library, and adjust its size if necessary. (Fig. 12-46)

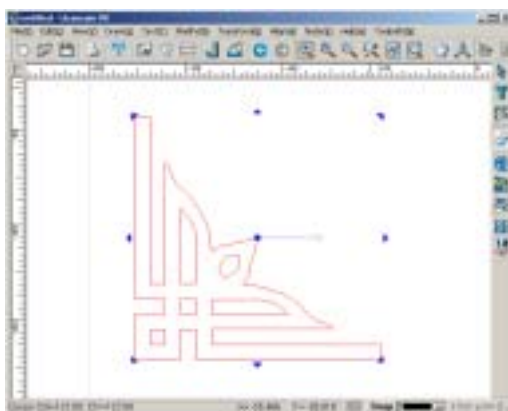



Fig. 12-46

Select the symbol, and click on the shortcut icon  on **Modification Bar** or select **Modify->Duplication->Array duplication** command in the menu bar. Then the Array Duplication dialog is displayed. (Fig. 12-47)

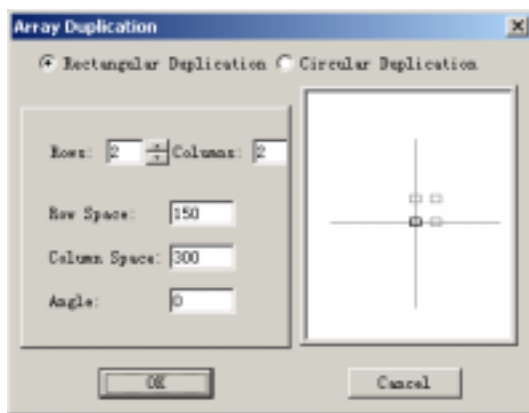


Fig. 12-47

Select **Rectangular duplication**, and set row space and column space at 150 and 300 respectively, rows at 2, column at 2, and then click on **OK** to end the setup. The result is shown in Fig. 12-48.

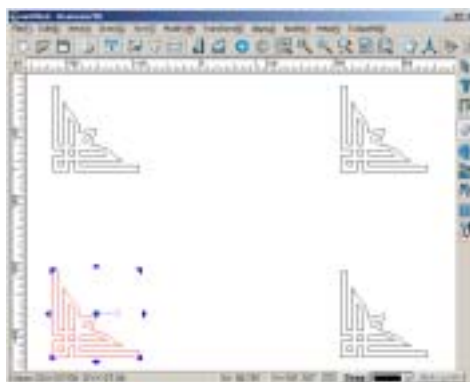


Fig. 12-48

4. Horizontally mirror the symbol in the upper left corner, horizontally mirror and then vertically mirror the symbol in the upper right corner, and vertically mirror the symbol in the lower right corner. The result is shown in Fig. 12-49.



Fig. 12-49

5. Select two more symbols from the **Symbol library**, and change the size of the symbol to make X value into 100. Align and group the symbols, and the result is shown in Fig. 12-50.



Fig. 12-50

6. Select another symbol from the **Symbol library**, and change the size of the symbol to make Y axis value into 200. The result is shown in Fig. 12-51.



Fig. 12-51

7. Press Ctrl + A key in the keyboard to select all the graphs, align the center of the graphs, and the result is shown in Fig. 12-52.



Fig. 12-52

8. Add a box around the symbol. (Fig. 12-53)

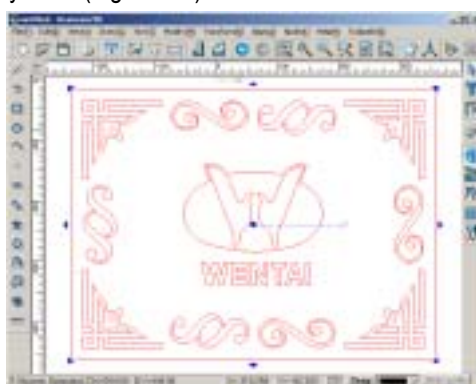



Fig. 12-53

9. Select all the symbols, and click on the shortcut icon  on Tool Path Bar or select Tool path->Intelligent machining command in the menu bar. Then the Intelligent machine dialog is displayed. (Fig. 12-54)

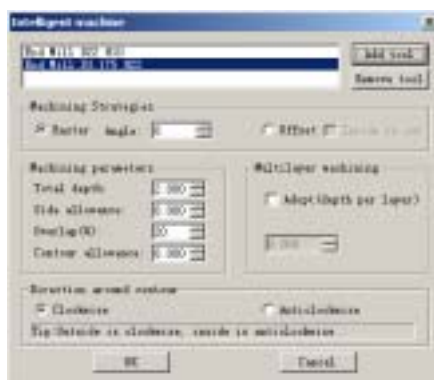


Fig. 12-54

10. Select two end mill tools with diameter of 3.175 and 22 respectively, choose machining depth of 3mm, overlap ratio of 60%, and choose anticlockwise. The result is shown in Fig. 12-55.

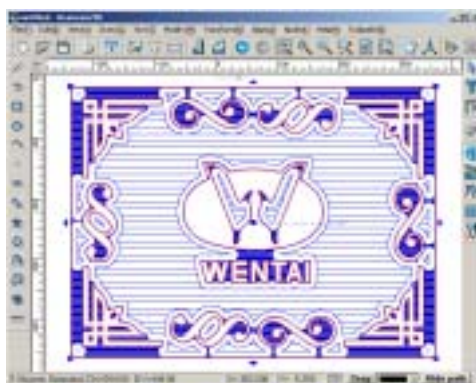


Fig. 12-55

11. Select the outer box, and apply profile machining to it. Select an end mill tool with a diameter of 3.175, height of 22, outside machining, total depth of 10, anticlockwise machining. Click on OK to get the result. (Fig. 12-56)

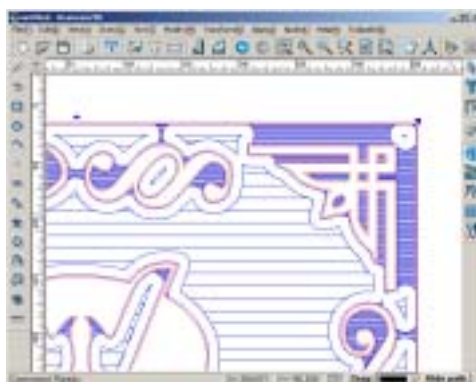


Fig. 12-56

12. Save the path: save the profile machining path with file named of file1.nc, base on feature


point A, cutter lift height of 10, and save the intelligent tool path with the file named file2.nc, not to select the feature point, and cutter lift height of 10.

Case 9. Embossing Machining

1. Launch Ucamcam V8 software.
2. Import an object. (Fig. 12-57)



Fig. 12-57

3. Click on the shortcut icon  on Tool Path Bar or click Tool path->Embossing machining command in the menu bar. Then the Embossing machining dialog is displayed. (Fig. 12-58)

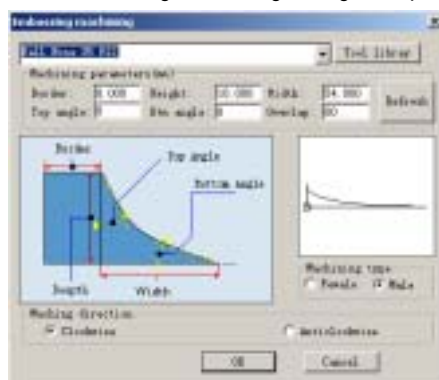


Fig. 12-58

4. Select a ball nose tool with a diameter of 2 and height of 12, and set the value of border at 2, height at 8, width at 19.774, top and bottom angles at 0 respectively, overlap ratio at 80%, and choose anticlockwise machining. The result is shown in Fig. 12-59.



Fig. 12-59

5. Hide the tool path, and select the graph for area clearance. Select an end mill tool with a diameter of 3.175 and height of 10, total depth of 8, overlap ratio of 80%, and choose anticlockwise machining. The result is shown in Fig. 12-60.




Fig. 12-60

6. Save the tool path: save the profile machining tool path with the file named file1.nc, base on feature point A, and cutter lift height of 10; save the area clearance tool path with file named file2.nc, not to select the feature point, and cutter lift height of 10; save the embossing machining tool path with file named file3.nc, not to select the feature point, and with cutter lift height of 10.

Case 10. Image FM/AM Machining

1. Launch Ucamcam V8 software.

2. Click on the shortcut icon  on Standard Bar or click File->Import command in the menu bar to import an image. The Import file dialog is shown. (Fig. 12-61)

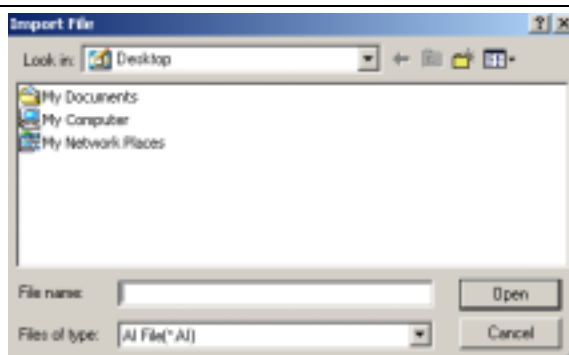


Fig. 12-61

3. Select an image in BMP format and open it. Adjust the size of the image to set X and Y both at 100, then the result is shown in Fig. 12-62.



Fig. 12-62


4. Select the graph, and click on the shortcut icon  in Tool Path Bar or click Tool path->Image AM machining command in the menu bar. Then the Image dot machining dialog is shown. (Fig. 12-63) Select a conical tool with a diameter of 0.3, angle of 15 degrees and height of 10, and set the horizontal and vertical space at 1 respectively, min brightness of 0.35, max brightness of 0.05, then the result is shown in Fig. 12-64.



Fig. 12-63

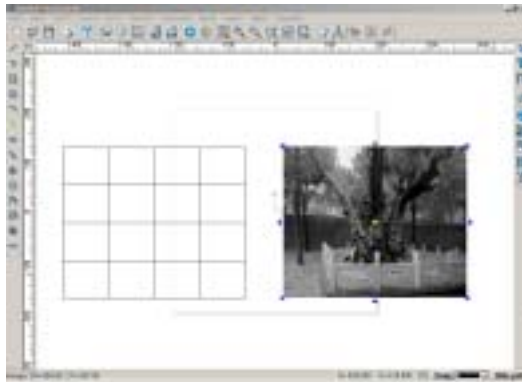


Fig. 12-64

5. Click **View->3D View** in the menu bar and then click on the right mouse button to select **ISO** view from the context menu. (See Fig. 12-65)



Fig. 12-65

6. Save the path: save the tool path with cutter lift height of 3, base on feature point A.

Case 11. Image Relief Machining

1. Launch Ucamcam V8 software.
2. Import an image and change the size to make X value into 100. The result is shown in Fig. 12-66.



Fig. 12-66


3. Select the image, and click on the shortcut icon  in Tool Path Bar or select Tool path->Image relief machining command in the menu bar. Then the Image relief machining dialog is displayed. (Fig. 12-67)



Fig. 12-67

Select a ball nose tool with a diameter of 2 and height of 12, choose min brightness of 2.5, max brightness of 0.1, overlap ratio of 80%, horizontal machining, and the result is shown in Fig. 12-68.

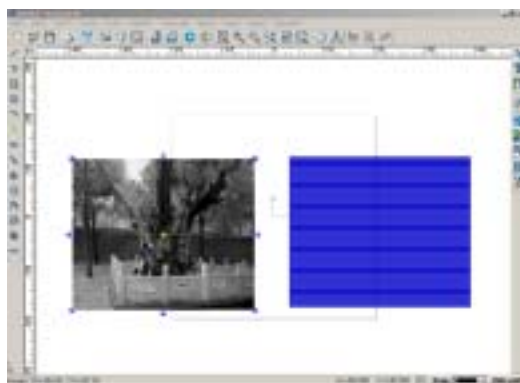


Fig. 12-68

4. Click View->3D View in the menu bar, and then click on the right mouse button and select ISO View from the menu. The result is shown in Fig. 12-69.

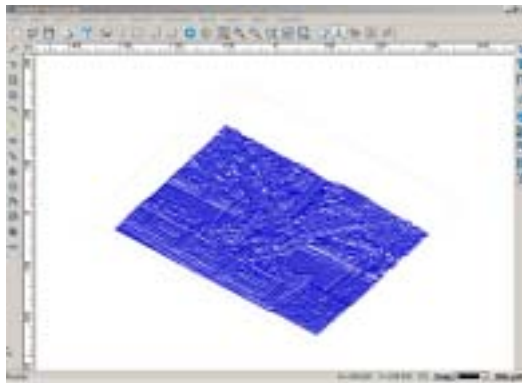


Fig. 12-69

5. Save the tool path: save the tool path with cutter lift height of 3, base on feature point A.

Note: The function of doing wave board is available only in UCanCAM V8 wave board software.

CHAPTER THIRTEEN WAVE BOARD

Beijing Wentai Technology corp. has successfully launched UCanCAM V8 wave board cad/cam software, making it easy for customers to design not only lines, curves, waves, and other designs which already exist on the market, but also new designs by editing or trimming. Besides, you can also trim out characters or graphs on waves, achieving unbelievable effect.

The following shows the ways to make these wave designs in UCanCAM V8.

13.1 Texture

1) Draw a straight line (Fig. 1), then draw a curve. The straight line the tool path on X and Y axis, and the curve determines the depth of the texture, which is the Z axis tool path. The wave height is the distance from the top to the bottom point of the wave.

(Fig. 2)



Fig. 1

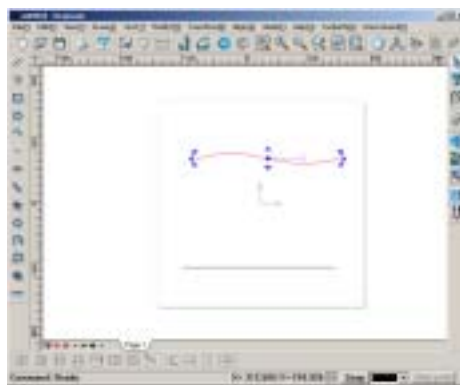


Fig. 2

Note: It is recommended to use curve when making textures.

2. Select the straight line, and then click **wave board -> texture** on the menu bar. A dialog is displayed. (Fig. 3)

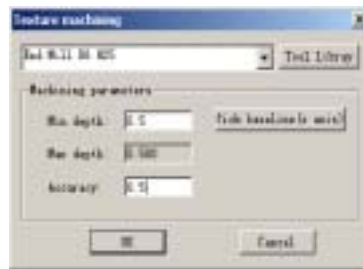


Fig. 3

3. Select a suitable tool, and set min depth, max. depth and accuracy, and then click with left mouse button on **Pick baseline (z axis)**. Then select the curve we have drawn. (Fig. 4)



Fig. 4

4. Click on **OK** to create the tool path. View the tool path in 3d view, then we get the clear effect. (Fig. 5)

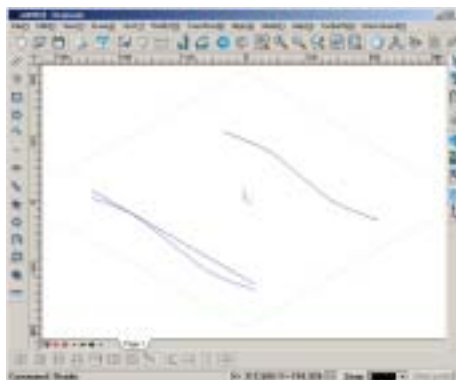


Fig. 5

Next, we are going to make a wave board with textures.

- 1 . Draw two straight lines that are parallel to each other, and draw two curves that are symmetrical. (Fig. 6)

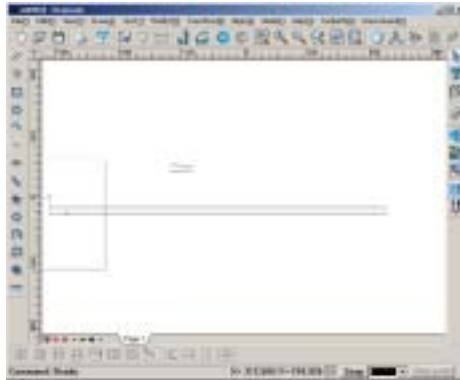


Fig. 6

2. Create tool paths for each pair of the two lines. Select one curve as baseline of one straight line, and select the other curve as the baseline of the other. The tool path is shown in Fig. 7.

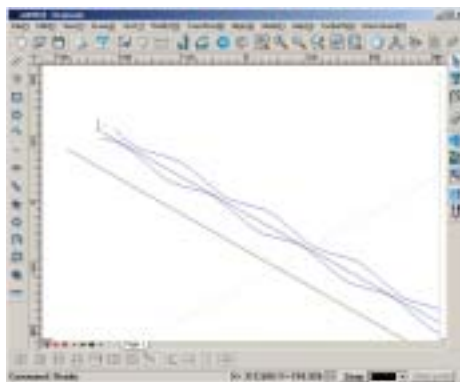


Fig. 7

3. Duplicate the tool path. (Fig. 8)

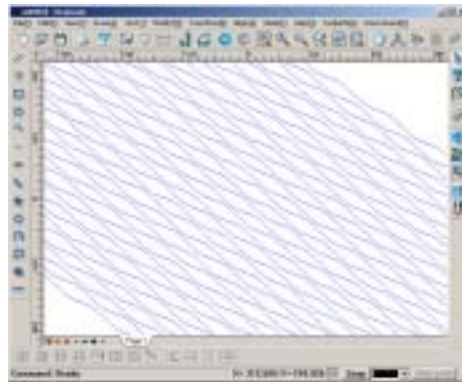


Fig. 8

13.2 Straight Texture

Click on **wave board** -> **straight texture**, and then the dialog is displayed. (Fig.

9)

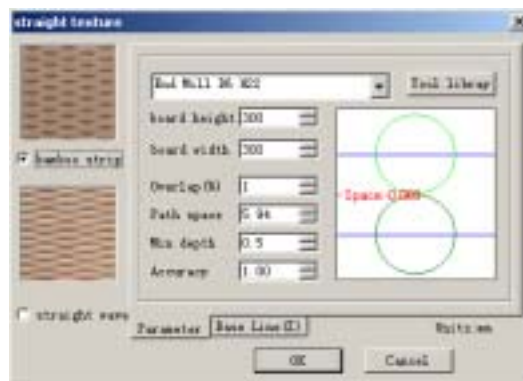


Fig. 9

Next we are going to explain the settings in this dialog.

Machining settings

Board height: the height of the board to be processed

Board width: the width of the board to be processed

Overlap: the proportion of the overlapped tool path to the last one

Path space: the space between each tool path

Min depth: the min depth the tool goes into the board

Accuracy: the accuracy of the texture. The accuracy is better when the setting is

lower, and the time needed for calculating is longer.

Note: Overlap and the path space are the same. So you need to just set one of them when creating the tool path.

Baseline setting (Fig. 10)

Height: the height of the z axis curve that is the depth of the tool going into the material.

$$\text{Height} = \text{min depth} + \text{wave height}$$

Width: the width of z axis curve

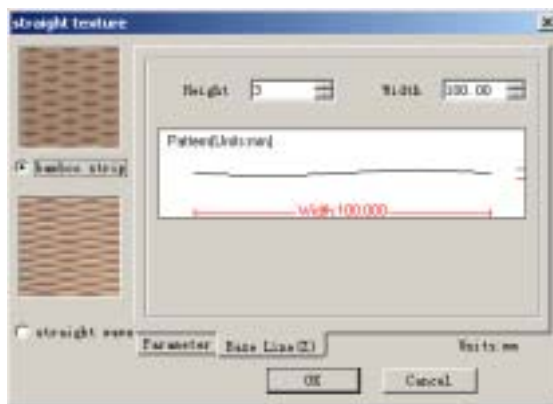


Fig. 10

Bamboo strip (Fig. 11)



Fig. 11

Straight wave (Fig. 12)

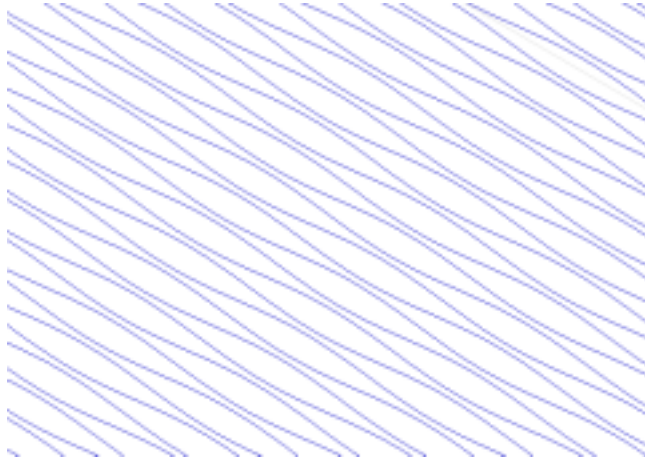


Fig. 12

13.3 Curvilinear texture

Click on **wave board** -> **curvilinear texture**, and a dialog is displayed. (Fig. 13)



Fig. 13

Machining settings are the same as straight texture.

Baseline settings



Fig. 14

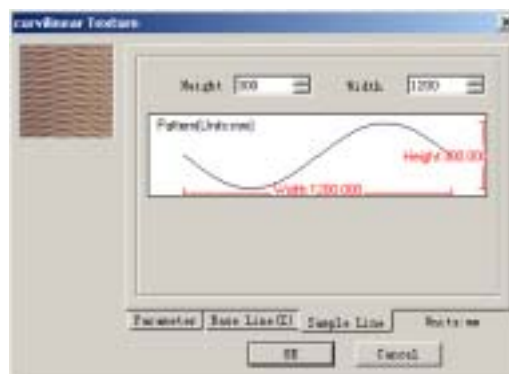
Sample line settings (Fig. 15)

Fig. 15

Height: the height of X axis curve.

Width: the width of Y axis curve.

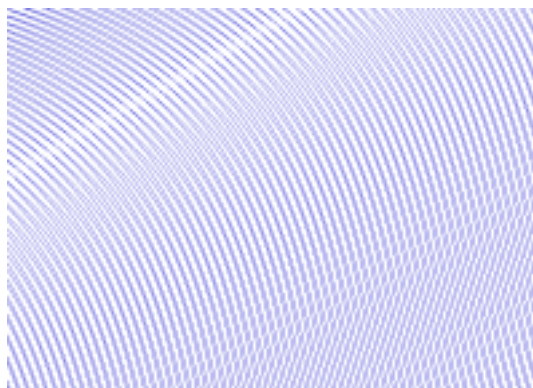


Fig. 16

13.4 Wave

Click on **wave board** -> **wave**, and a dialog is displayed. (Fig. 17)



Fig. 17

Wave angle: the angle of the machining path of the curve

Fold height: the height of the wave fold

Baseline parameters (Fig. 18)



Fig. 18

Sample line parameters (Fig. 19)

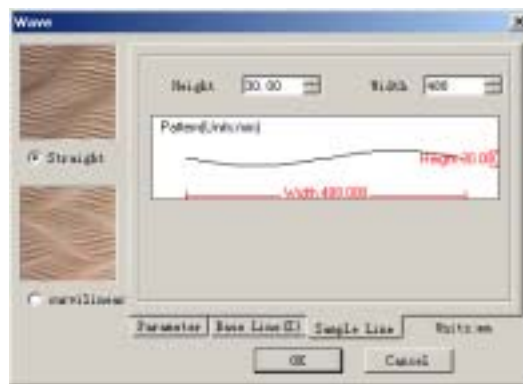


Fig. 19

Machining settings are the same as curvilinear texture. (Fig. 20)

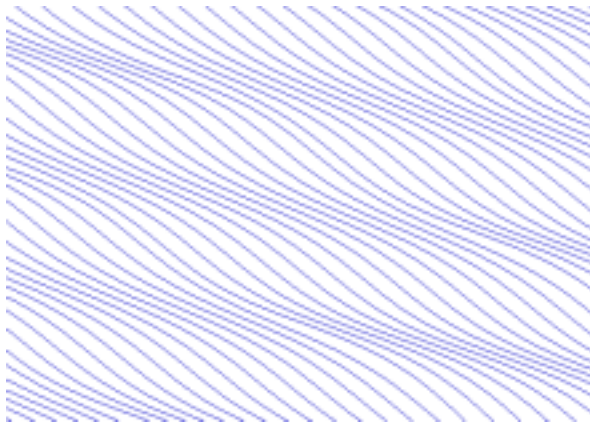


Fig. 20

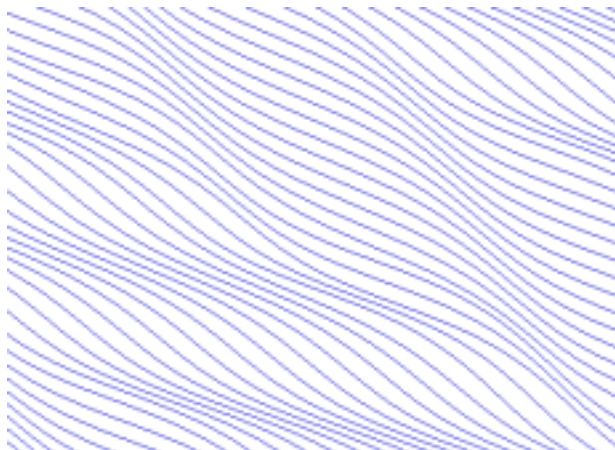


Fig. 21

13.5 Silk Texture

Silk texture is a kind of solid wave boards.

There are three ways to make silk textures.

1. Middle wider: the texture start to become narrow on the two ends, the middle part is the widest.
2. Start wider: the texture is wildest at the beginning, and then goes lower.
3. End wider: the texture is wildest at the end, just the opposite of Start wider.

Draw some anomalistic curves and lines. (Fig. 22)

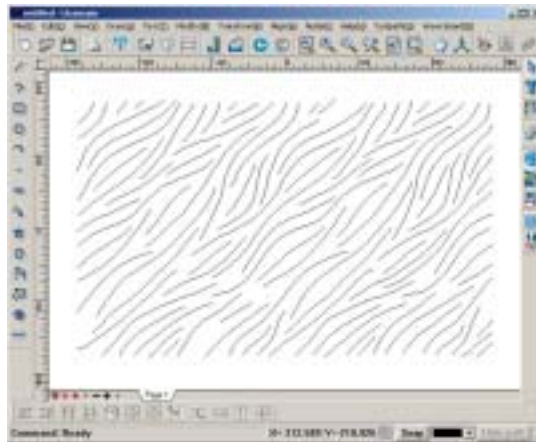


Fig.22

Select all the lines and curves, and then click wave board -> silk texture from the menu bar. A dialog is displayed. (Fig. 23)



Fig. 23

Set the parameters in the dialog to create tool path, and then click on **OK**. (Fig. 24)

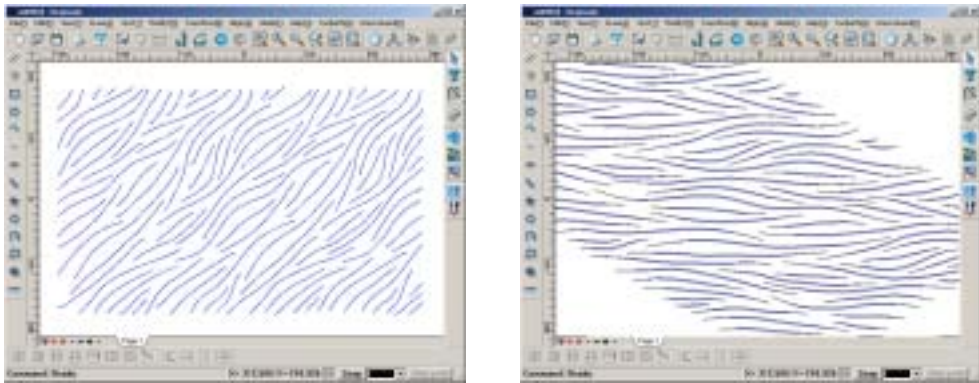


Fig. 24

13.6 Texture Trimming

Sometimes we need to make a rectangle from the tool path of the wave board (Fig. 25), at this time, we need to use texture trimming function.

Click on **wave board-> texture trimming** on the menu bar, and a dialog is displayed. (Fig. 26)

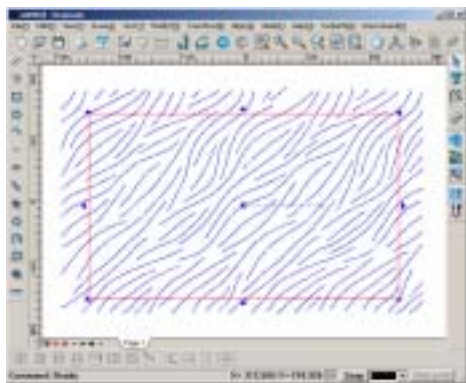


Fig. 25

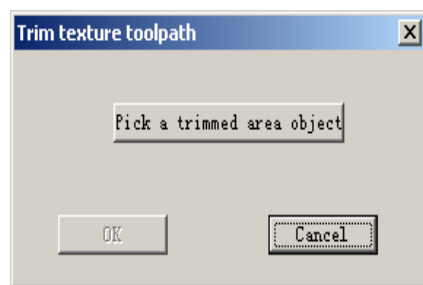


Fig. 26

Click on Pick a trimmed area object, and then the screen displays the main window panel. Move the mouse, when the rectangle becomes blue, click on the left mouse button. Then a dialog is displayed. (Fig. 27)

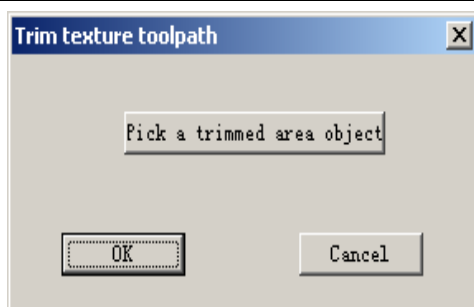


Fig. 27

Click on OK to finish the operation, then the following result is shown. (Fig. 28)

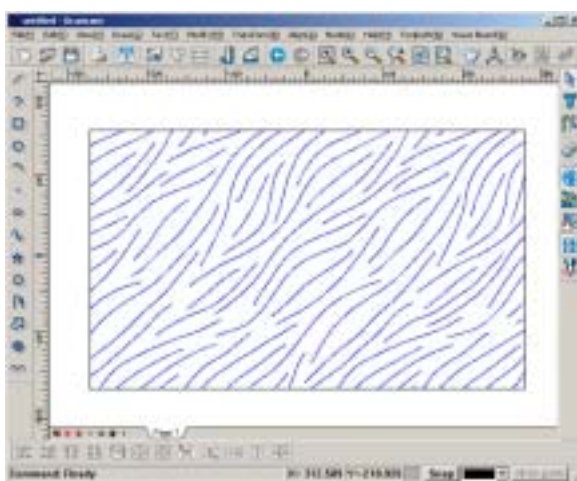


Fig. 28

After creating the tool path, click on tool path-> toolpath output on the menu bar to save it. Then you can start the machining.

Besides the above-mentioned waves, you can also create new ones by the editing, trimming, modification and other functions in UCanCAM V8 software.